VOL. XXII. Nº 11. NOVEMBER 1937

MECCANO MAGAZINE

TAPPING A STEEL FURNACE

6D.

DRIVER CLARKE SAYS "IT'S FINE!"

The new HORNBY

SCALE MODEL OF
L·M·S RECORD-BREAKER

"Princess Elizabeth"

Four hundred miles non-stop at an average of 70 m.p.h.; maximum speeds of 95 m.p.h.; Beattock bank and Shap incline surmounted at 66 m.p.h. with a 260-ton load! These remarkable feats were performed by L.M.S. 4-6-2 *"Princess Elizabeth,"* in charge of Driver T. J. Clarke, on a special run in November 1936.

Think of the thrill of owning a model of such an engine; not merely a perfect reproduction in miniature, but one having the same qualities of power, speed and efficiency! This is now made possible by the latest product of Meccano Ltd.—the magnificent Hornby scale model locomotive *"Princess Elizabeth."* Look at the photograph above! What a splendid appearance the model has with its massive six-coupled driving wheels, fascinating valve gear, and Royal nameplate! It is driven by a 20-volt electric motor, fitted with the world-famous Hornby Remote Control.

Price, complete with tender in special presentation box, £5 5s. 0d

The model may be purchased also through the new Hornby Deferred Payments Scheme Ask your dealer for details. (Not available outside Great Britain and Northern Ireland.)

HORNBY TRAINS

MECCANO LIMITED, BINNS ROAD, LIVERPOOL 13

The MYSTERIOUS BLUE BOTTLES

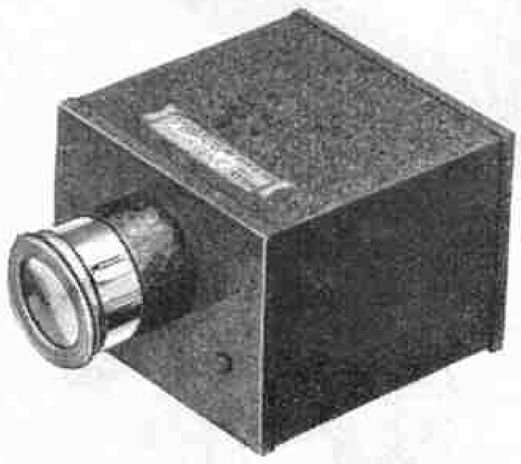
Hamley's News
HAMLEY · BROTHERS · LTD · ESTABLISHED 1760

200-202, REGENT ST., LONDON, W.1. OUR ONLY ADDRESS
Telephone: REGENT 3161

The SPARKING TRAIN

No. 26 November, 1937

NEW INVENTION PROJECTS PICTURES ON SCREEN WITHOUT SLIDES!



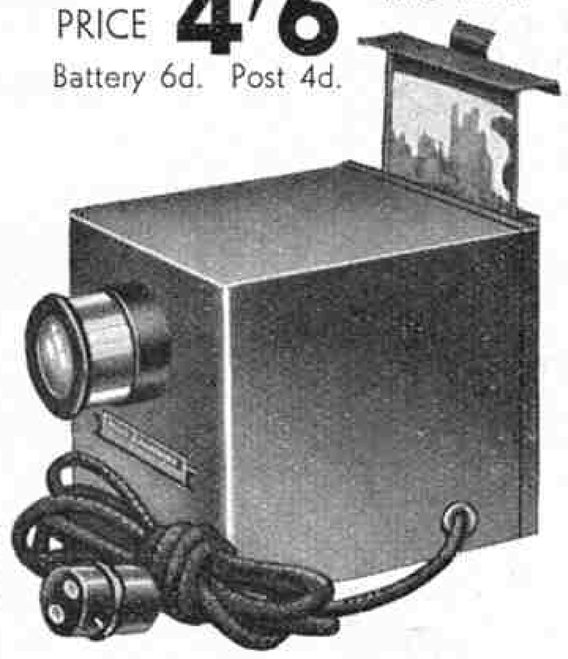
AND ITS ELDER BROTHER

THE MILLS EPISCOPE JUNIOR

operates with a single lamp off the main and will project all sizes of pictures up to 3½"x2½"—with amazing clarity.

With electric lamp
(State mains voltage when ordering)

PRICE **12'6**
Post 6d.



THE MILLS EPISCOPE MINOR

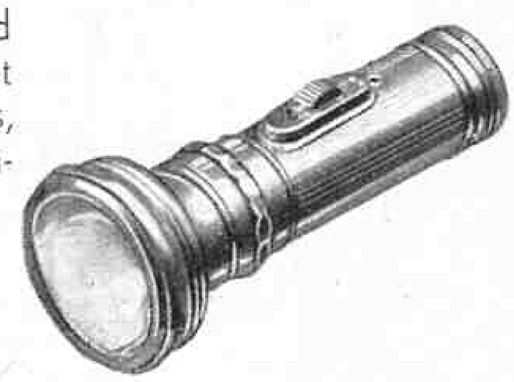
designed to project cigarette cards, stamps and miniature camera snapshots; gives brilliant two foot image on the screen at a throw of four to five feet.

PRICE **4'6**
Battery 6d. Post 4d.

SPECIAL VALUE TORCH

Nowhere in the world is a torch offered at so great a value and so small a price. The ideal pocket light. Length 4", adjustable focus, chromium plated case, and complete with battery. (Foreign.)

PRICE **1'3**
Post 3d.



FOR THE YOUNG GUNMAN

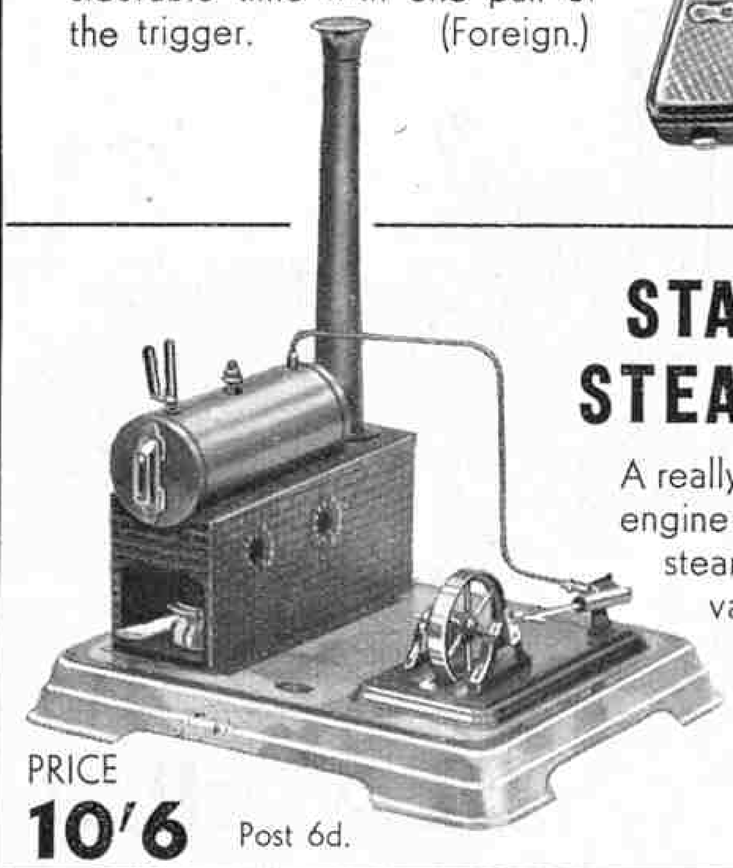
The 'G' Man Sparking Automatic is a fascinating toy and quite harmless. It is a clockwork pistol which continues to fire for a considerable time with one pull of the trigger. (Foreign.)

PRICE **2'6**
Post 3d.

The MYSTIC BOTTLES

Watch their astounding antics; seeing is believing and you won't believe them till you have seen them for yourself. They're up to all manner of hilarious tricks and drolleries.

PRICE **1'6**
Post 2d.



STATIONARY STEAM ENGINE

A really beautiful model steam engine with tall chimney, steam whistle and safety valve. A lifelike toy of scientific interest, yet easy to work and absolutely safe. Will instruct while it amuses. (Foreign)

PRICE **10'6** Post 6d.

THE "SPARKS FLY"

Handsome Shunting Engine on rails with automatic change red and green electric lights. Sparks fly from the funnel of the engine when it is in motion, complete with battery. (Foreign.)

PRICE **5'6**
Post 6d.

TRI-ANG

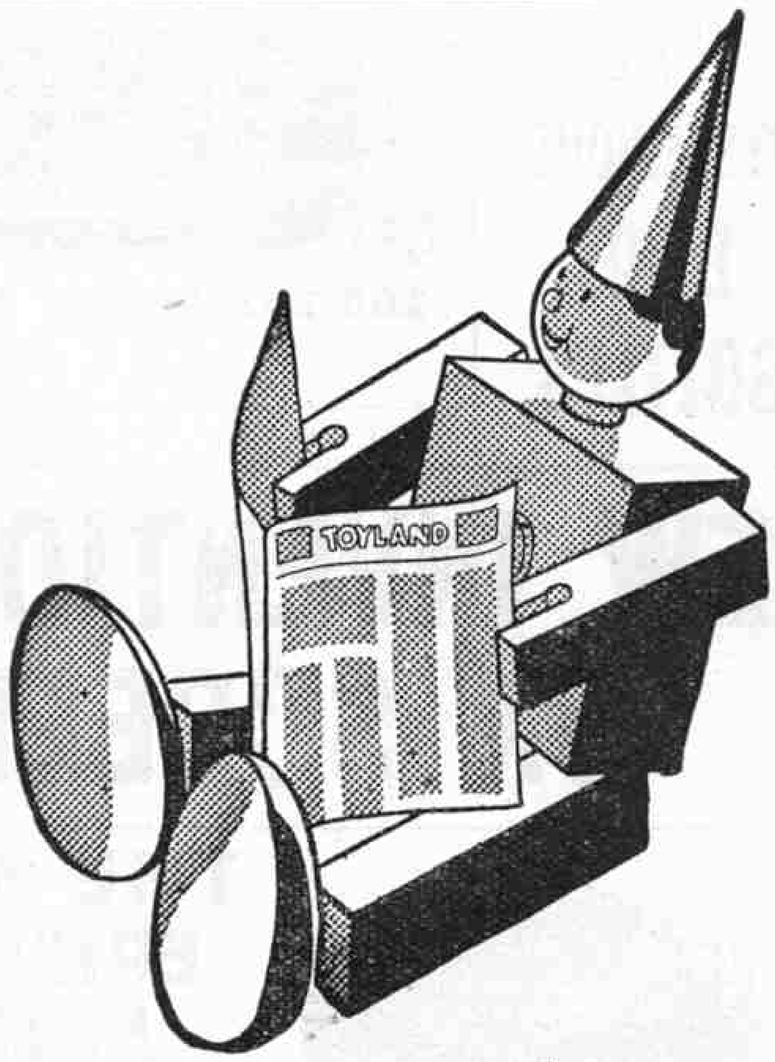
FIT-BITS

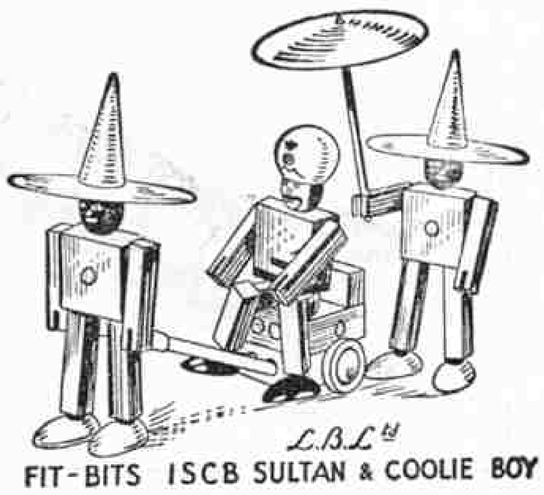
TRADE MARK

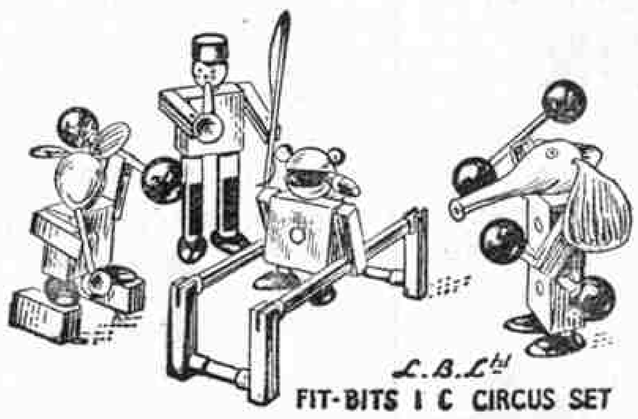
Patent pending in most countries.

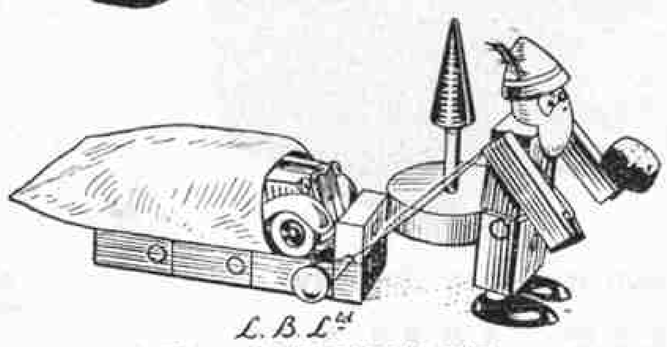
FIT-BITS model making gives scope for initiative.
The variety of models and the highly amusing attitudes possible ensures for FIT-BITS a warm welcome in any home.
FIT-BITS will intrigue young-hearted people of all ages—few will be able to resist its mirth-provoking features.
All parts are beautifully coloured and there are **no sharp edges or metal parts.**
You FIT the BITS together with the special patented safety rubber connections.

GET A SET OF FIT-BITS TO-DAY!




L.B.L^td
FIT-BITS ISCB SULTAN & COOLIE BOY


L.B.L^td
FIT-BITS I C CIRCUS SET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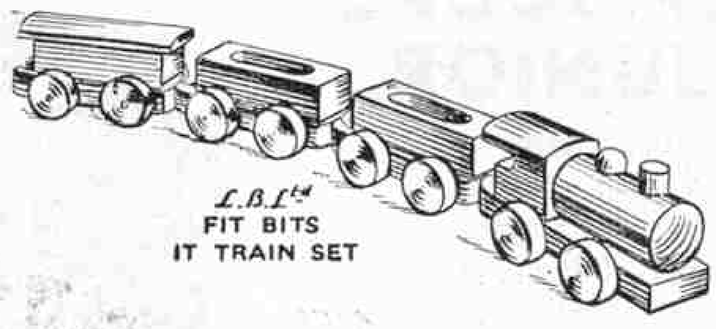
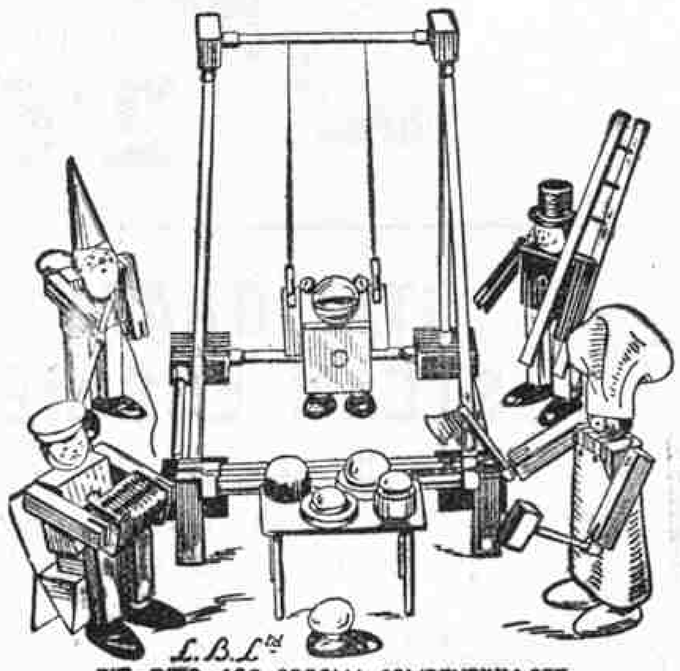
FIT-BITS SETS

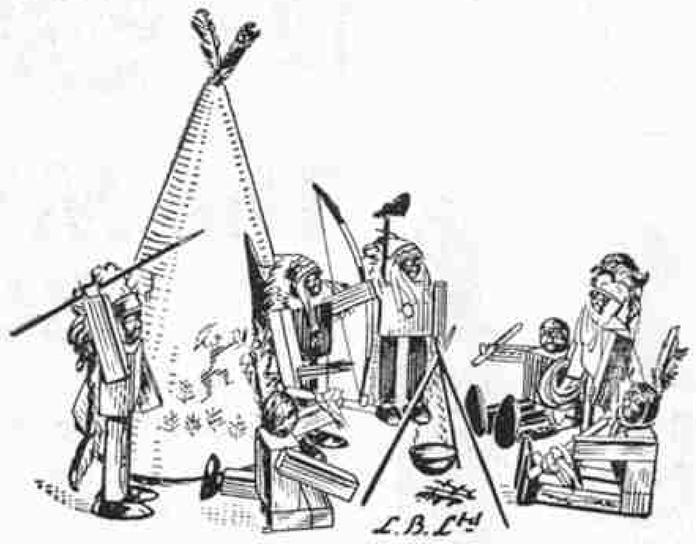
Retail from **1'11** to **25'-**

Obtainable from all Good Toy Shops and Stores


L.B.L^td
FIT BITS
IT TRAIN SET


L.B.L^td
FIT-BITS 4SS SPECIAL COMPENDIUM SET

L.B.L^td
FIT-BITS 3MM FIVE MERRY MEN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FIT-BITS RI RED INDIAN SET

DEALERS!

Our Xmas Advertising Campaign Commences Shortly
Thousands of Children will want these Toys

LINK UP WITH A SPECIAL DISPLAY

Made by LINES BROS. LTD., TRI-ANG WORKS
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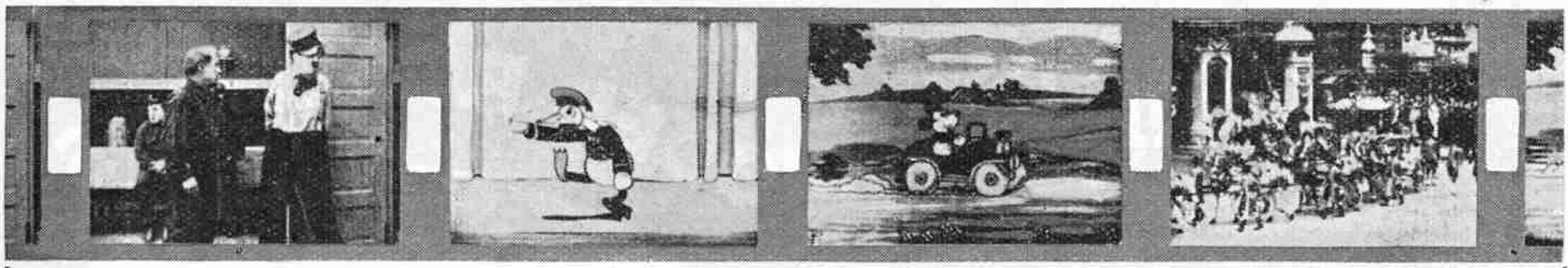
MADE IN ENGLAND



We've all the film stars at our party

MICKEY MOUSE—CHARLIE CHAPLIN—DONALD DUCK—AND HEAPS OF OTHERS (INCLUDING A WONDERFUL "CORONATION" FILM). IT'S JUST LIKE A REAL MOVIE SHOW IN YOUR OWN HOME.

For the Bingoscope is a mechanically perfect miniature Cinema Projector that shows brilliant flickerless pictures and is in every way the equal of projectors costing very much more.

It is solidly built to last, and designed to take 9.5 mm. *non flam* Films. Ask for a demonstration at your toy shop or stores. But first write for the illustrated leaflet, and a free gift that will appeal to every boy or girl, comes with it.

BATTERY MODELS			MAINS MODEL
Model B.1.	...	5/-	B.4.
Model B.2.	...	10/6	25/-
Model B.3.	...	17/6	

25/-
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BINGOSCOPE

MADE IN ENGLAND

THE LEADING JUVENILE CINEMA

FREE GIFT

of Safety Dart Board with rubber-nosed dart.

Send the Coupon now!

Write now for the Safety Dart Board and for the new Bingoscope illustrated leaflet to L. Rees & Co. Ltd. (Dept. M.M.), 12, New Union Street, London, E.C.2.

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Address.....

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HORNBY COMPLETE MODEL RAILWAYS

Complete Equipment for commencing the fascinating Model Railway Hobby

Hornby Complete Model Railway Sets provide the simplest way of beginning the thrilling Hornby Railway hobby. Four Sets are available and each is complete in itself; everything is there, ready for use as soon as you get it home.

Unpack the box, then lay out the rails and accessories as shown in the illustration provided, put the locomotive and coaches or wagons on the track, and begin to run your own railway! It's the greatest fun in the world!

MECCANO LTD., BINNS ROAD, LIVERPOOL 13

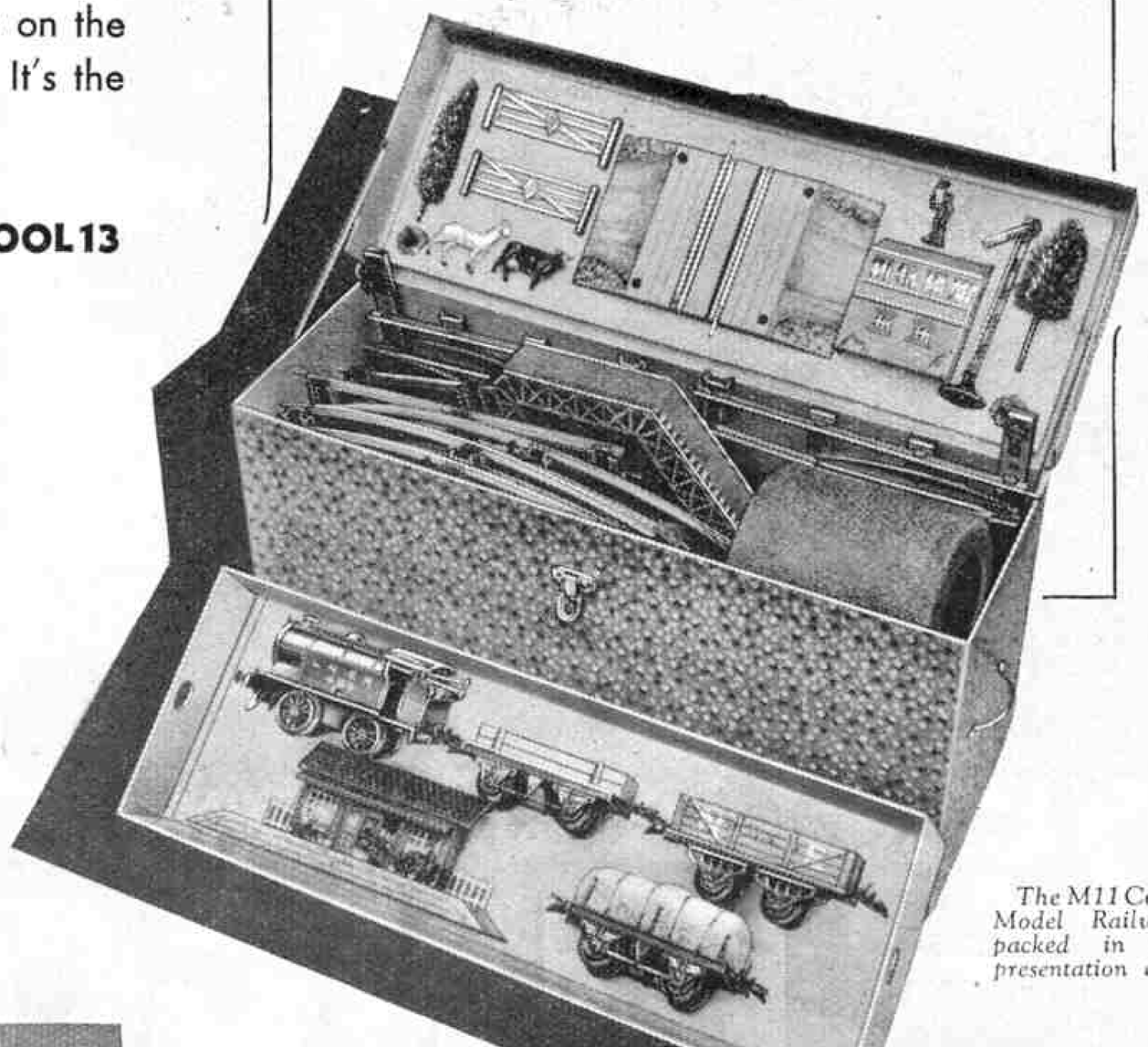
THE RANGE OF HORNBY COMPLETE MODEL RAILWAYS

M8 Complete Model Railway
Consists of Locomotive (non-reversing) and Tender, Track, Goods Wagons, and other components for an attractive small home railway. Packed in carton. Price **8/11**

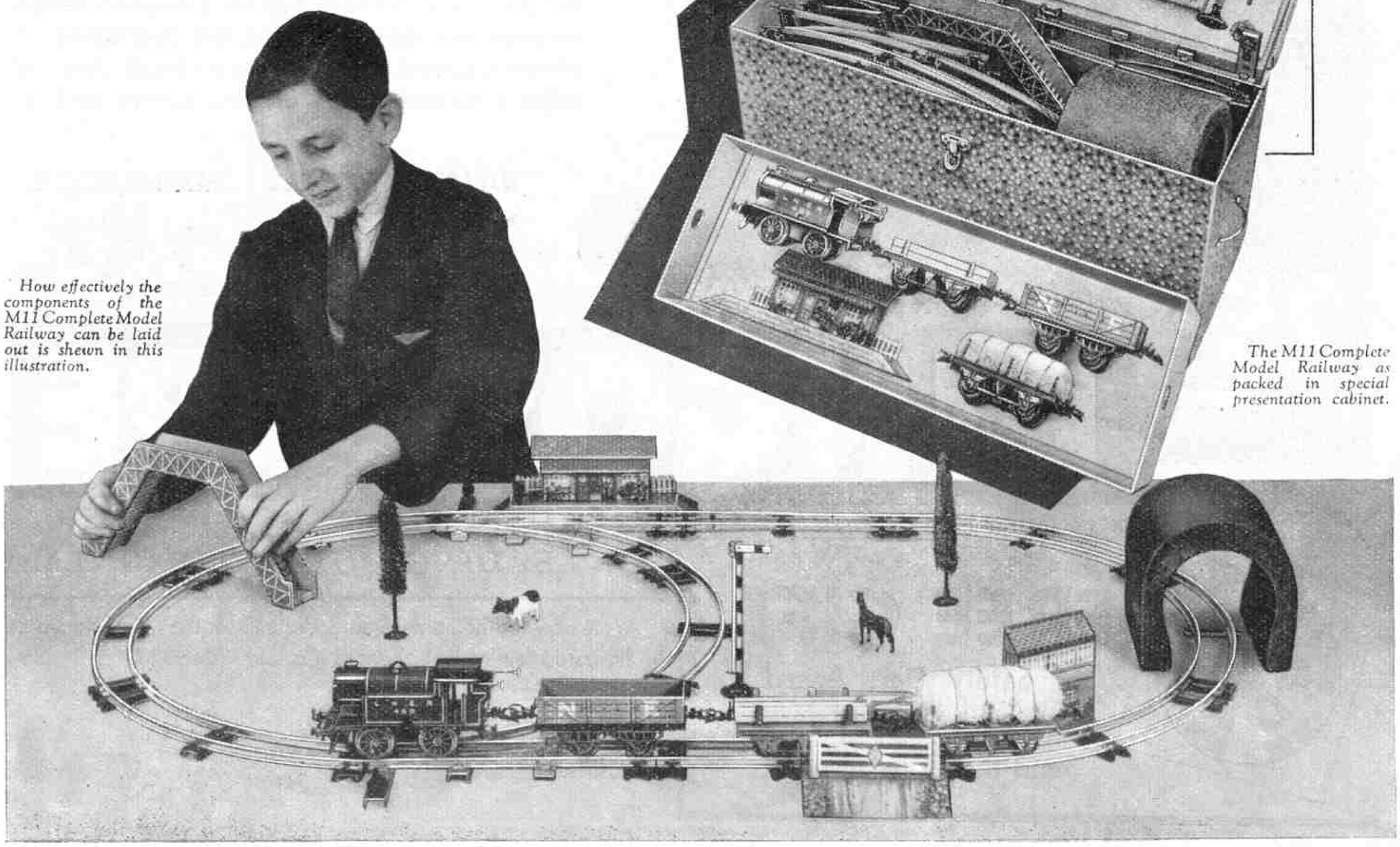
M9 Complete Model Railway
The Locomotive and Tender are similar to those in the M8 Set. There are Passenger Coaches in place of the Goods Wagons, more Track and extra components. Packed in carton. Price **11/6**

M10 Complete Model Railway
A larger Set, packed in a special cabinet. A fine range of components is included in addition to a Locomotive (non-reversing), Tender and Coaches. Price **18/9**

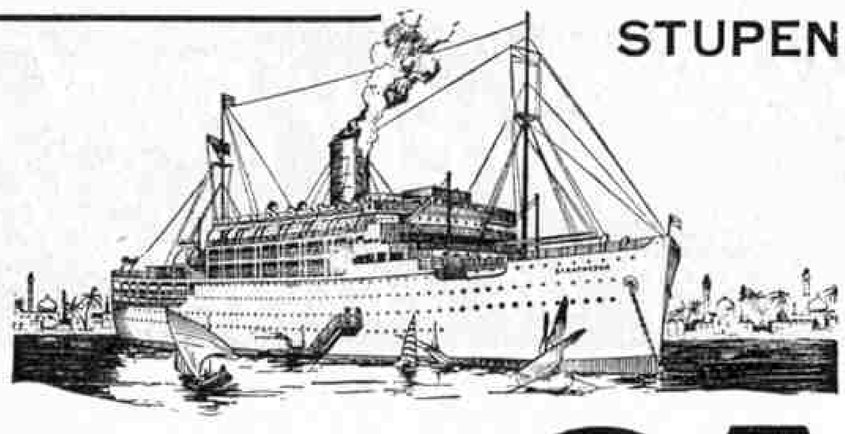
M11 Complete Model Railway
This is the best of the four Sets. It includes a fine reversing Tank Locomotive and all the accessories to make the splendid model railway illustrated below. The neat cabinet in which the Set is packed is shown in the reproduction herewith. Price **25/-**



The M11 Complete Model Railway as packed in special presentation cabinet.



How effectively the components of the M11 Complete Model Railway can be laid out is shewn in this illustration.



STUPENDOUS ATTRACTION—EXCLUSIVE TO GAMAGES

A JOYOUS CRUISE TO MAGIC EGYPT IN THE LATEST AND GREATEST P. & O. LUXURY LINER "STRATHEDEN"

A delightful, realistic Christmas season voyage, going ashore to the Valley of the Kings and the Gift Hall of a thousand surprises. Glamorous Egyptian maidens will greet you here, and bestow the riches of the East upon you. And would you believe it, Father Christmas himself is seeking a warmer clime this year, and he will actually be there with his lucky parcels.

Don't miss this unique attraction—on Ground Floor from November 1st.

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GIANT CHRISTMAS BAZAAR

BRITAIN'S SUPREME CHRISTMAS SHOW FOR BOYS OF ALL AGES

OPENS EARLY NOVEMBER

★National Headquarters for Meccano, Hornby Trains and Speed Boats

★Greatly Enlarged Displays of the above are an Outstanding Feature of the Bazaar

THE NAME Gamages GUARANTEES THE VALUE

★See the Giant Hornby Layout—Three Trains running at once

★An Unequalled Selection of Toys, Models, Games, Chemistry and Electrical Sets, Model Aeroplanes, etc. Expert Demonstrations Daily

VERTICAL STEAM ENGINE

A splendid Steam Engine at a remarkably low price. It represents the best possible value in the cheaper range of steam engines. Complete with Safety Valve and Whistle, Filler, Can and Lamp. Height 10½ in.

Post 6d. **5/-** *Foreign*

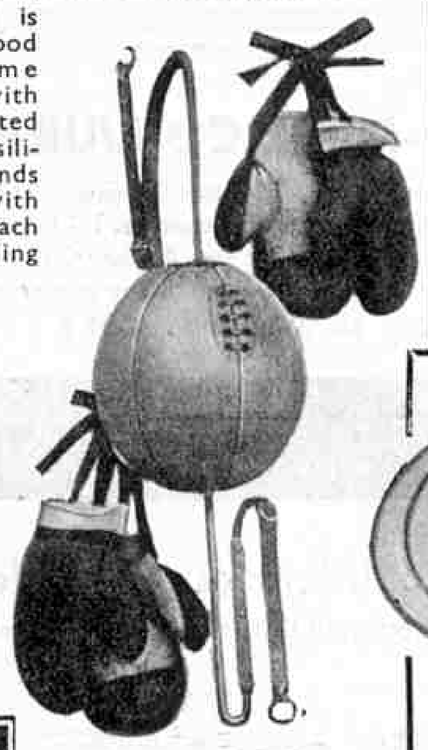
SET OF BOYS' BOXING GLOVES & PUNCHBALL

The Finest Value Obtainable

The Punchball is made from good quality Chrome Suede Leather, with six sections. Fitted ½ in. moulded resilient rubber strands and ⅝ in. straps, with nickel ring at each end, floor and ceiling hooks.

The Boxing Gloves have Covers of selected Tan Sheep Skin and palms of Buff Suede Leather. Fitted with finger and side pads, and laced wrists. Adequately padded with hair.

Punchball and Set of Four Boxing Gloves Complete



16/9

THIS WILL KEEP YOU FIT.

Post 9d.

Or separately: PUNCHBALL, 8/11.
SET OF FOUR BOXING GLOVES, 8/6.
Post 6d. on either.

READY MID-NOVEMBER

GAMAGES GIANT CHRISTMAS TOYS, MODELS, AND GAMES LIST

Post Free on Request

5ft. SOLID OAK rail BILLIARD TABLE FOR ONLY 49/6

Laminated Bed of Superior Quality. Scientifically Battened to obviate Warping.

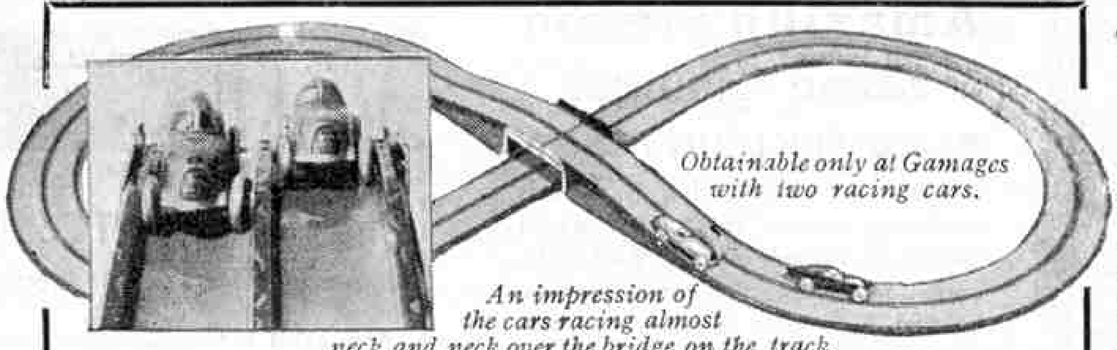
DELIVERED ON FIRST OF SIX MONTHLY PAYMENTS OF 9/-

Carriage Paid to nearest railway station Eng. or Wales.

(Overall size 5 ft. 4 in. by 2 ft. 9 in.)

The cushion rails are of the "Gamage" heavy design. Solid Para Rubber Cushions positioned to ensure maximum resiliency and billiard table "angle" accuracy. Bed and cushions covered with English woven cloth. Pocket plates leather covered and fitted cord pocket nets. Adjustable rubber-covered feet for levelling.

COMPLETE WITH THESE ACCESSORIES—Set of Guaranteed turned Composition 1½ in. Billiard Balls. Two 4 ft. Cues, large Marking Board fitted with brass runners and pointers, Chalk and Booklet of Rules. Also supplied finished beautiful Mahogany colour–same price. Or with a 16/6 Snooker Set, £3/6/–. Or 6 monthly payments of 12/–. **Booklet of Snooker Rules 1/–.**



Obtainable only at Gamages with two racing cars.

An impression of the cars racing almost neck and neck over the bridge on the track.

THE FAMOUS "SPEEDWAY" with Two Cars

The entire Track, when assembled, measures 57 in. long by 25½ in. wide. Each section is firmly fixed together by clips. The two clockwork Cars measure 4 in., and are fitted with brakes. Two keys are included. With one winding the Cars will lap the track seven or eight times at racing speed. Three or four Cars can be raced simultaneously and greatly add to the excitement and fun.

COMPLETE 6/11 (Foreign). *Post 6d.*

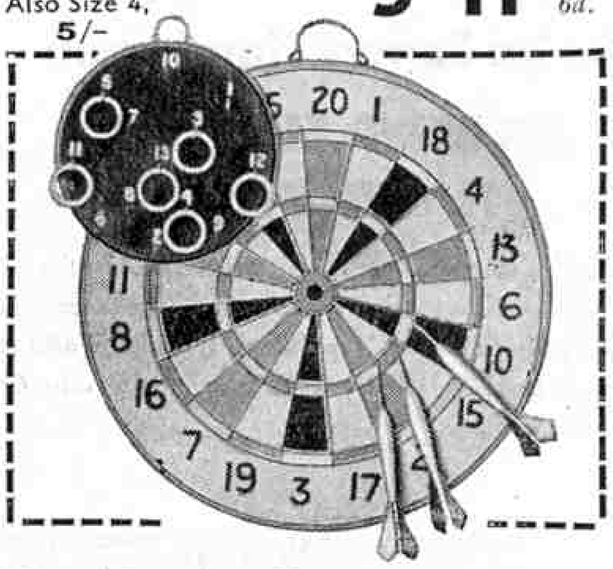
Extra Cars, Complete with Brake, 9d. each.

The GAMAGE "POPULAR" 12 PANEL FOOTBALL

Splendid quality leather. Hand sewn. Supplied complete with lace and best quality red rubber bladder. Match size. The Football for hard use.

5/11 *Post 6d.*

Also Size 4, **5/-**



Two Popular Games for the Price of One!

COMBINATION RING and DART BOARDS

Games of skill that are coming more and more into demand. The Ring Board is well finished in mahogany colour, highly polished, and fitted with heavy quality brass hooks, each numbered above in Red and Gold. With six heavy rubber rings. **On the reverse side is the fully wired cork Dart Board** of standard clock pattern. Supplied with three feather flighted darts. A leaflet containing the rules of darts is included.

COMPLETE 5/6 *Post 8d.*

GAMAGES, HOLBORN, LONDON, E.C.1. *Telephone: Holborn 8484.*

WONDERFUL NEW HOBBIES—NEW FUN
thrilling Discoveries in Science!

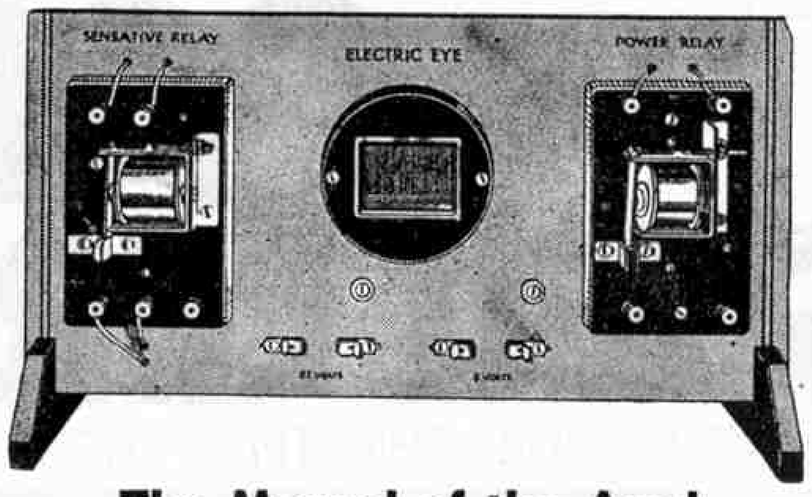
Marvels of science and electricity are opening up new realms of interest for boys. Think how thrilled you'll be to learn about amazing scientific triumphs while you enjoy grand fun. Gilbert products teach while they entertain. They are more than toys. They give you hours and hours of marvellous amusement and enable you to gain valuable knowledge. Ask to see Gilbert products at your local stores and toy shops. But first of all, post the coupon below for Free Catalogue.

Explore New Worlds of Mystery!

MICRO-CHEMISTRY SETS

Hidden from the naked eye there is a mystery world full of astonishing creatures and exciting secrets. A drop of stagnant water is teeming with life. Weird wonders are disclosed by the Microscope in Gilbert Micro-Chemistry Sets. There is also a big assortment of chemicals and apparatus for performing hundreds of experiments. The mystery of Folar Rays is explained by the remarkable "Folaroid." Complete with Instruction Manual. No. 5 Outfit **15/-**

No. 7. Larger Micro-Chemistry Set 25/-

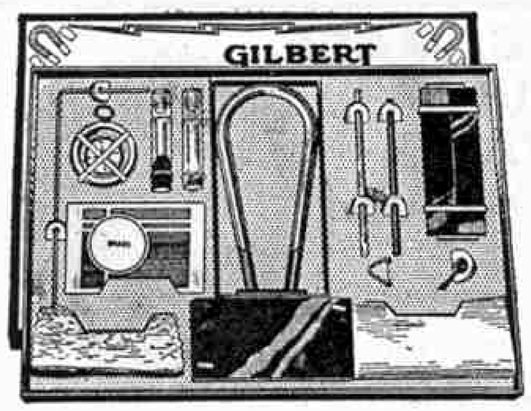


The Marvel of the Age!

GILBERT ELECTRIC EYE

One of the most amazing discoveries of the day is the Electric Eye. It enables you to do astonishing things. A flash of light will ring a bell. You can switch off the radio by waving your hand, switch off the electric light by lighting a match or rig up fire alarms or bells that ring at sunrise. Hundreds of intriguing things can be done with this simple, scientific Outfit. Nothing to learn. Nothing to go wrong.

Complete with instruction booklet **25/-**



Learn about Electricity

MAGNETIC FUN & FACTS

This is the age of Electricity! Here's an instructive outfit that teaches all about Magnetism and Static Electricity. Gives endless amusement. Enables fascinating experiments to be performed. Contains a powerful horseshoe magnet, bar magnets, compass and other parts for doing numerous stunts and tricks. Complete with instruction book **5/-**

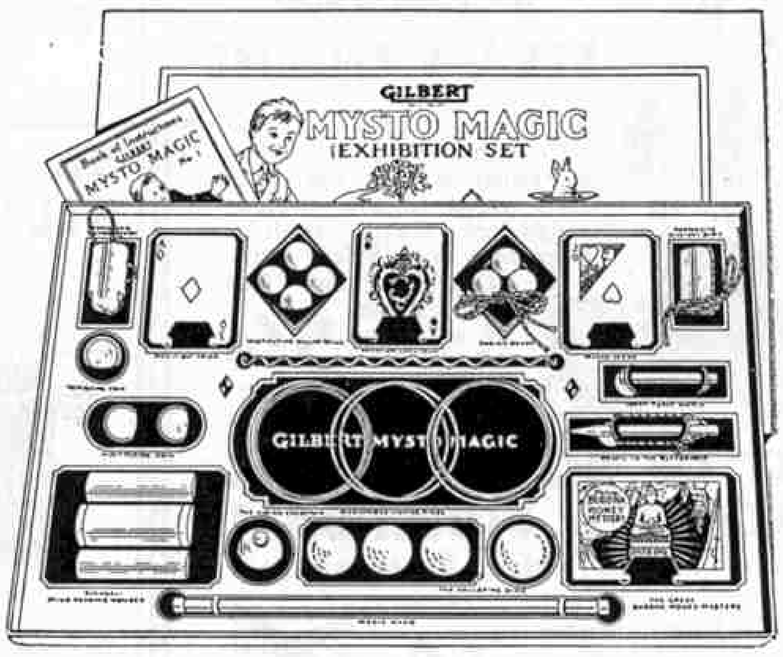
Also larger outfit **10/6**

Be an Expert Handyman

GILBERT ELECTRIC HAND DRILL

Here's a powerful, speedy electric hand drill for the young handyman's workshop. It saves time and labour. Ensures accurate drilling. A boon to the model maker. Takes up to ¼" drills. Works off A.C. or D.C. house current, 110/115, 200/220 or 230/250 volts. Complete with switch, chuck and flex. Improved Model **32/6**

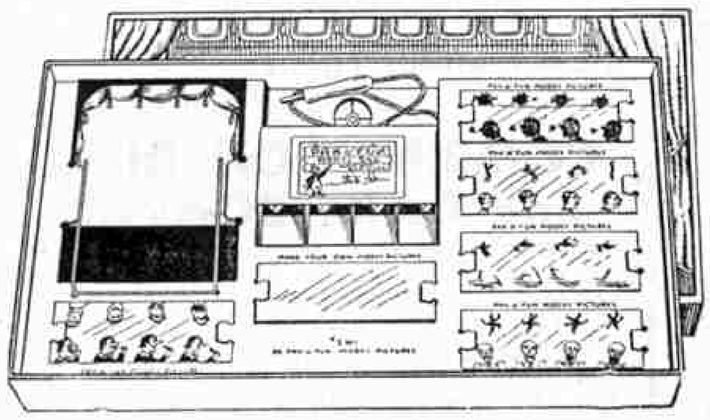
Be the "Life of the Party"



GILBERT Mysto-Magic CONJURING SETS

Few things make a boy so popular as being able to do conjuring tricks. If you have a Gilbert Conjuring Trick Set you will be in demand at parties. These sets contain amazing, mystifying tricks that are not found in any other sets. All the tricks are easy to perform. Set No. 1, containing twelve mysterious tricks **5/-**

Larger Sets: No. 3, **10/6**; No. 4, **12/6**



Amazing Simple Home Cinema!

PAK O' FUN MOOVY SHOW

You'll have endless fun with this miniature cinema. It shows animated pictures in a simple manner. Works off a pocket lamp battery. Contains screen, lighting equipment, amusing films, and also plain films on which you can draw your own cartoons. **5/-**

GILBERT Scientific and Instructive products for Young People

IF any difficulty in obtaining these locally, send your Order, with Postal Order, to us.

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The A.C. GILBERT Co., 109, Kingsway, London, W.C.2

Please send me the Free illustrated Catalogue of Gilbert Scientific Toys.

Also send me..... *Write here which of these goods you want.*

for which I enclose Postal Order for.....

Name.....

Address.....

M.M.2 .....

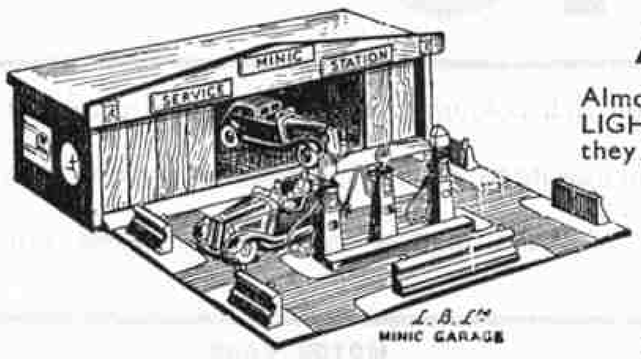
Print Clearly in Capital Letters

MINIC

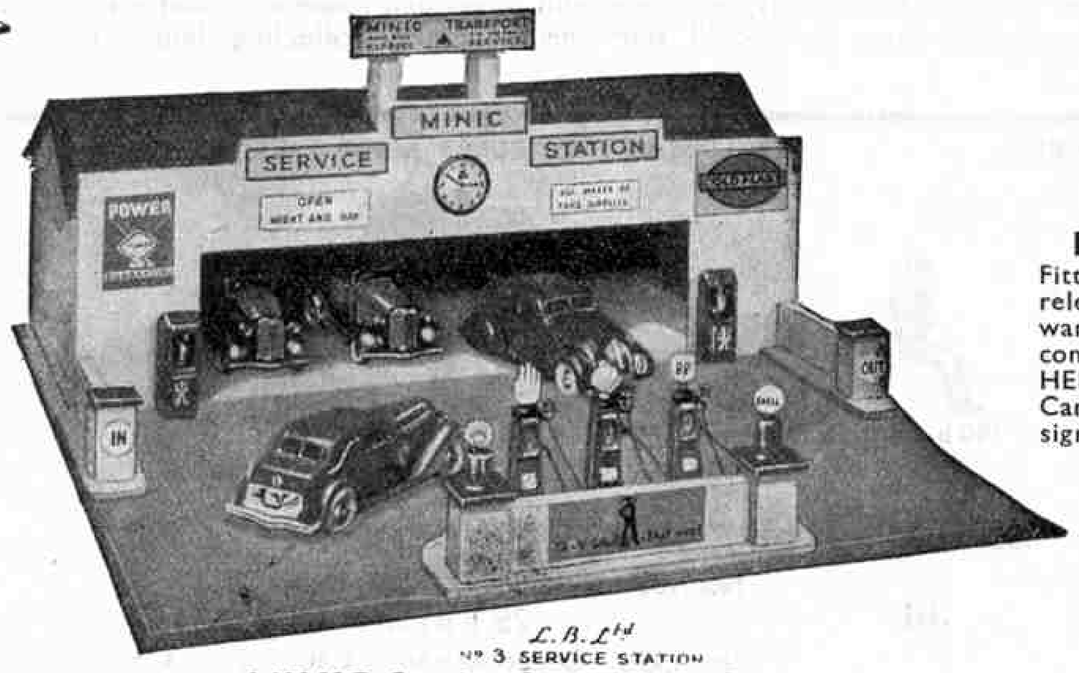
Regd. Trade Mark

ALL TO SCALE CLOCKWORK TOYS

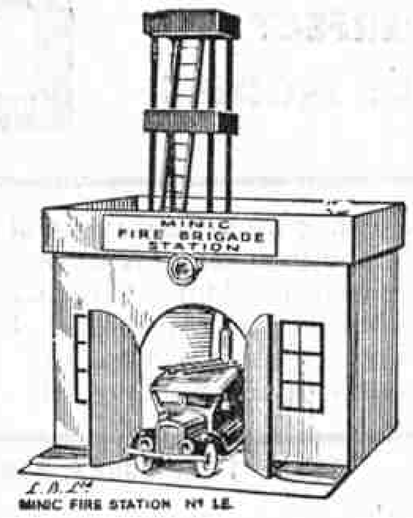
Almost every type of vehicle on the road represented; some with ELECTRIC LIGHTS. Strongly constructed and fitted with powerful, long-running mechanism, they will run anywhere, EVEN ON THE CARPET. Each model is beautifully finished in a variety of colours, and packed singly in an attractive box.



MINIC Garage
Realistic new design, fitted with sliding doors and electric light. Equipment includes three large petrol pumps and one large oil cabinet. Light oak finish with folding base.
LENGTH 12 ins. Price **6/6**

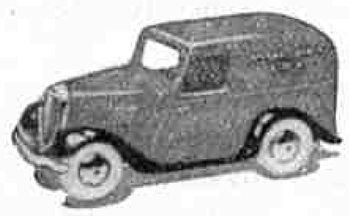


MINIC Service Station No. 3
Realistic design, imitation red tiled roof with sign, three large petrol pumps, one large oil cabinet, two electric lights and battery, dummy clock face and other signs. LENGTH 16 ins. Price **9/11**
CARS NOT INCLUDED.



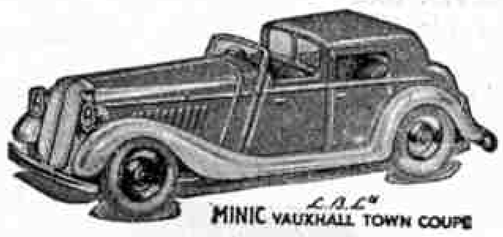
MINIC Fire Station No. 1E
Fitted with novel mechanical device which releases Fire Engine, automatically lights warning signal and rings alarm. Supplied complete with battery.
HEIGHT 12½ ins. Price **12/6**
Can also be obtained without warning signal, etc. Price **5/11**

MINIC Light Tank
LENGTH 3¼ ins.
Price **1/6**

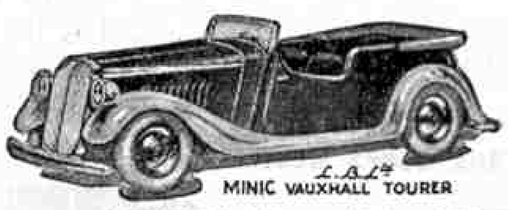


MINIC Ford Royal Mail Van
LENGTH 3⅜ ins.
Price **6d.**

LENGTH 5¼ ins.
With Electric Light and Battery **3/6**
Without Electric Light **2/6**

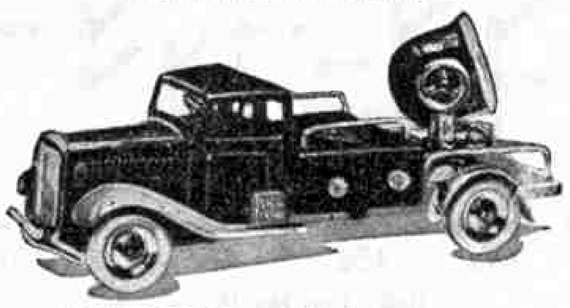


LENGTH 5⅛ ins. Price **1/3**

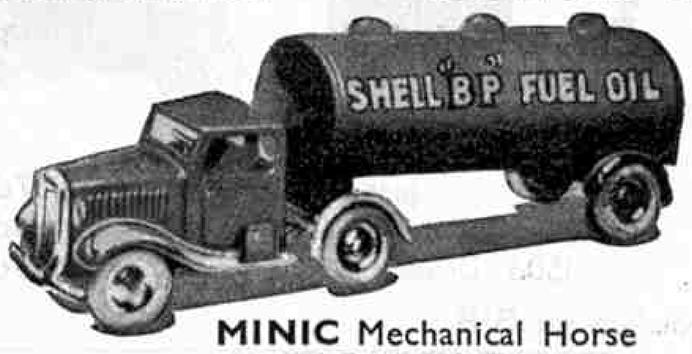


LENGTH 5 ins. Price **1/3**

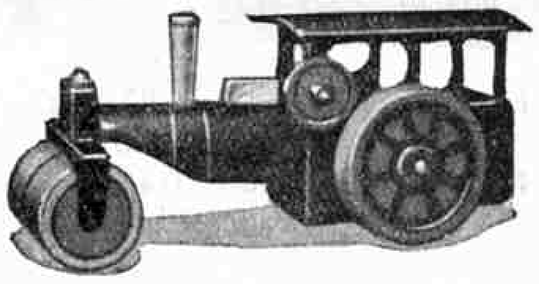
LENGTH 5¼ ins. Price **2/–**



MINIC Searchlight Lorry
with Electric Searchlight and Battery.
LENGTH 5¼ ins. Price **3/6**

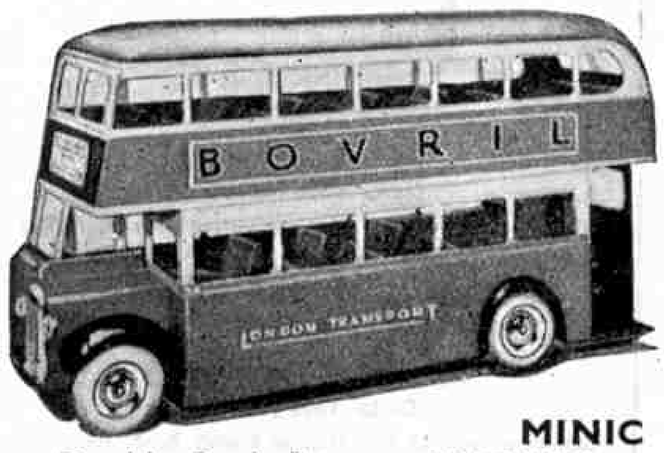


MINIC Mechanical Horse and Fuel Oil Trailer
LENGTH 7 ins. Price **2/–**

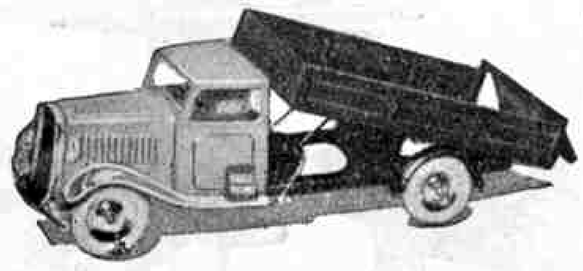


MINIC Steam Roller
LENGTH 5¼ ins. Price **2/–**

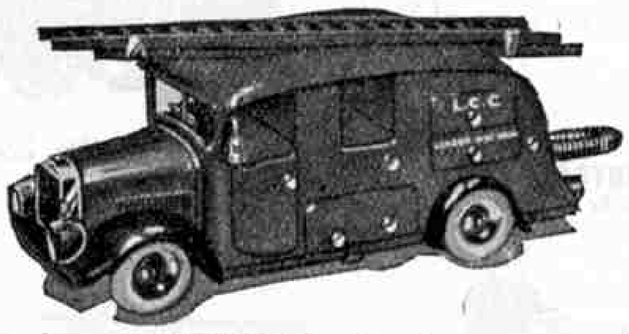
MINIC Dust Cart
LENGTH 5½ ins. Price **2/–**



MINIC
Double Deck Bus LENGTH 7½ ins.
Price **5/–**



MINIC Tip Lorry
Price **1/3**
LENGTH 5½ ins.



MINIC Fire Engine
with Electric Headlamps and Battery.
LENGTH 6½ ins. Price **6/6**

OVER FORTY MODELS FROM WHICH TO CHOOSE—SOME WITH ELECTRIC LIGHTS.

OBTAINABLE AT ALL GOOD TOY SHOPS AND STORES.

MINIC Breakdown Lorry
with Mechanical Crane.
LENGTH 5½ ins. Price **3/6**

DEALERS

Our Xmas Advertising Campaign starts shortly. LINK UP WITH A SPECIAL DISPLAY

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PERFECT SCALE MODELS

DINKY TOYS

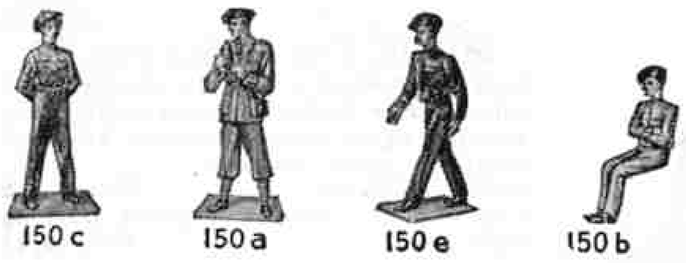
OVER 250 VARIETIES

Collecting Dinky Toys is one of the most fascinating of all hobbies. These realistic miniatures are unique in their rich colouring and perfection of design and finish, and their range is so wide as to appeal to all tastes.

This year, in addition to reducing the prices of many of the existing models and sets, we have introduced several new items, including wonderful scale models of military Tanks and Aeroplanes, latest types of Motor Cars, complete with driver and passenger, and many others.

Every boy or girl who has not already done so should start this delightful collecting hobby to-day. All the models can be purchased either separately or in complete sets.

ROYAL TANK CORPS PERSONNEL

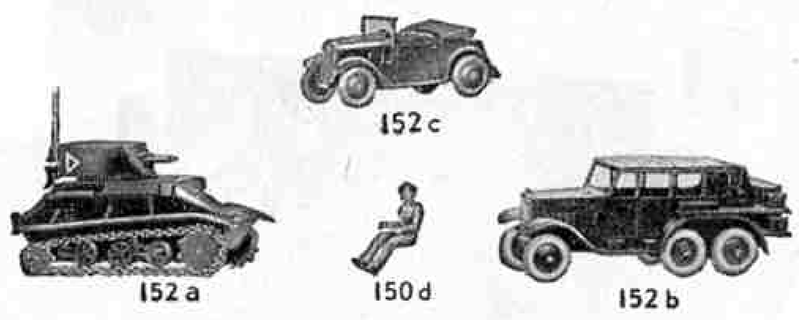


Dinky Toys No. 150

No. 150a Officer ... ... each **3d.**
No. 150b Private in sitting position (2) ... „ **3d.**
No. 150c Private in standing position (2) ... „ **3d.**
No. 150e N.C.O. ... ... „ **3d.**
Price of complete set **1'6**

Dinky Toys Nos. 150b, 150c, 150d and 150e can each be purchased in boxes containing one dozen at the special price of **2'9** per box.

ROYAL TANK CORPS LIGHT TANK SET



Dinky Toys No. 152

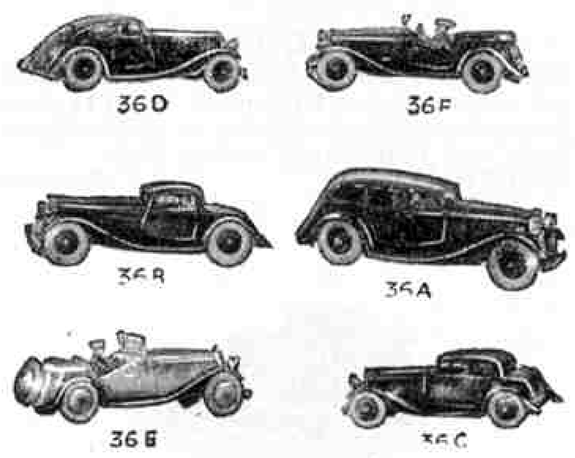
No. 152a Light Tank (4½ tons, 25 h.p.) ... ... each **1'1**
No. 152b Reconnaissance Car „ **1'-**
No. 152c Austin Seven Car „ **4d.**
No. 150d Driver ... ... „ **3d.**
Price of complete set **2'9**

AUSTIN SEVEN CAR

Dinky Toys No. 35d

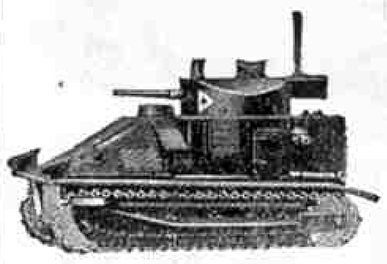
This model is the same as No. 152c, illustrated above, except that it is finished in a range of different colours. Price **4d.** each.

MOTOR CARS
WITH DRIVERS, PASSENGERS, ETC.



Dinky Toys No. 36
Fitted with detachable rubber tyres. Silver-plated radiators.

No. 36a Armstrong Siddeley (Limousine) with driver and footman ... each **11d.**
No. 36b Bentley (Two-seater Sports Coupe) with driver and passenger ... „ **11d.**
No. 36c Humber (Vogue Saloon) with driver and footman ... ... „ **11d.**
No. 36d Rover (Streamline Saloon) with driver and passenger... ... „ **11d.**
No. 36e British Salmson (Two-seater Sports) with driver ... ... „ **11d.**
No. 36f British Salmson (Four-seater Sports) with driver ... ... „ **11d.**
Price of complete set **5/6**

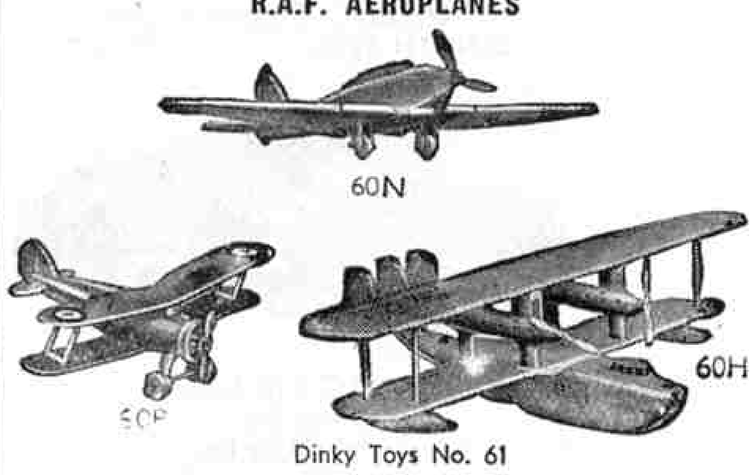


ROYAL TANK CORPS MEDIUM TANK SET

Dinky Toys No. 151

No. 151a Medium Tank (12 tons, 90 h.p.) ... ... each **1'6**
No. 151b Three-ton Transport Wagon ... ... „ **1'-**
No. 151c Cooker Trailer with jack stand ... ... each **7d.**
No. 151d Water Tank Trailer ... „ **5d.**
No. 150d Driver ... ... „ **3d.**
Price of complete set **3'9**

R.A.F. AEROPLANES



Dinky Toys No. 61

No. 60h "Singapore" Flying Boat ... ... each **1/-**
No. 60n Fairey "Battle" Bomber (2)... ... ... „ **4½d.**
No. 60p Gloster "Gladiator" Biplane (2) ... ... „ **6d.**
Price of complete set **2/9**

EMPIRE FLYING BOATS

Dinky Toys No. 60r

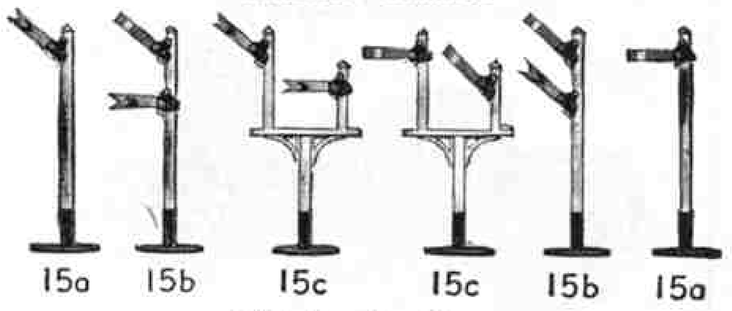
Scale models of the latest Imperial Airways Flying Boats. Six models available named: *"Caledonia," "Canopus," "Corsair," "Challenger," "Centurion"* and *"Cambria."* Price **1/-** each.

ATLANTIC FLYING BOAT

Dinky Toys No. 60x

Similar in type to the Empire Flying Boat. Assorted colours. Price **1/-** each.

RAILWAY SIGNALS



Dinky Toys No. 15

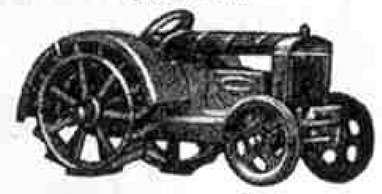
No. 15a Single Arm Signals ("Home" and "Distant") each **2d.**
No. 15b Double Arm Signals (2) ... ... „ **3d.**
No. 15c Junction Signals ("Home" and "Distant") „ **4d.**
Price of complete set **1/6**

ROYAL AIR MAIL SERVICE CAR

Dinky Toys No. 34a
In correct colours and fitted with detachable rubber tyres.
Price **6d.** each

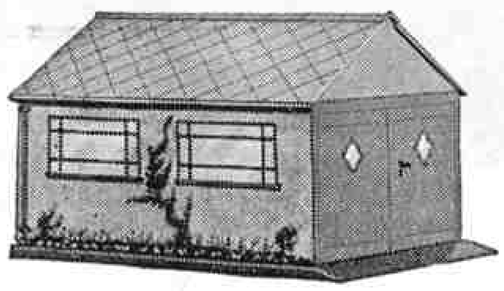
Ask your dealer to show you the complete range of Dinky Toys.

TRACTOR



Dinky Toys No. 22e
Price **9d.** each

GARAGE



Dinky Toys No. 45
Fitted with opening double doors. Will accommodate any two Dinky Toys Motor Cars. Price **1/3** each

STREAMLINE FIRE ENGINE

Dinky Toys No. 25k
Finished in red.
Fitted with six firemen, bell, ladder and detachable rubber tyres. Price **1/-**

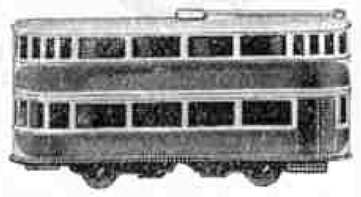
POLICE MOTOR CYCLIST
Dinky Toys No. 37b

Price **6d.** each

CIVILIAN MOTOR CYCLIST
Dinky Toys No. 37a

Assorted colours.
Price **6d.** each

TRAM CAR

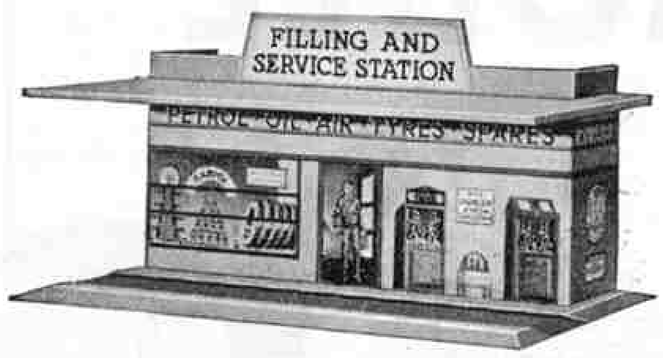


Dinky Toys No. 27
Assorted colours.
Price **3d.** each

MECCANO LIMITED — BINNS ROAD — LIVERPOOL 13

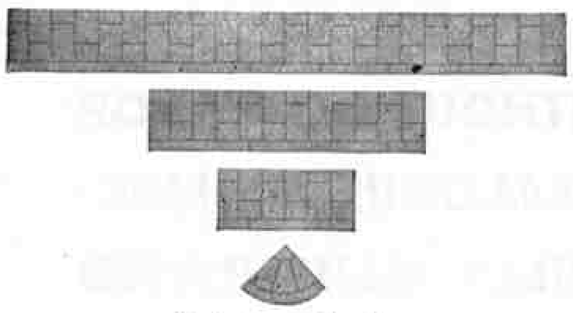
A FASCINATING COLLECTING HOBBY — DINKY TOYS — FINISHED IN RICH COLOURS

PETROL STATION



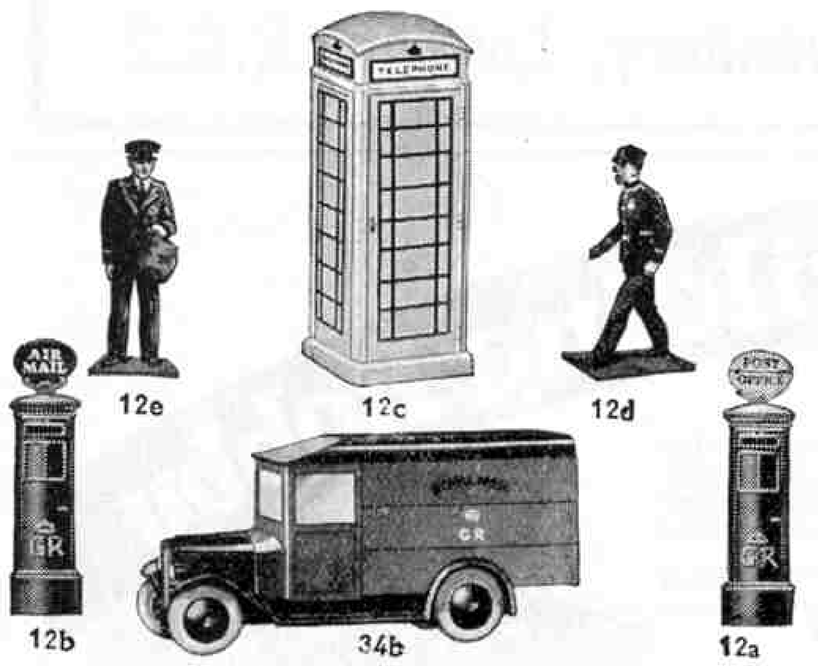
Dinky Toys No. 48
Accurate reproduction of a filling station.
Price **1/3** each

PAVEMENT SET



Dinky Toys No. 46
The contents of this set are four 3 in., six 6 in. and four 12 in. strips of pavement and four quarter discs for corners. Price of complete set **6d.**

POSTAL SET



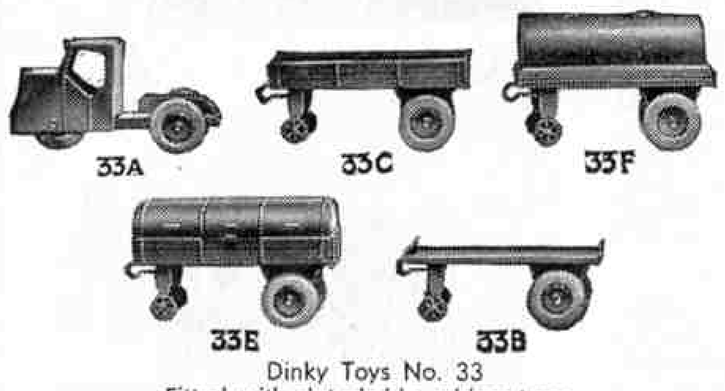
12b 12e 12c 12d 34b 12a

Dinky Toys No. 12

No. 12a	Pillar Box, G.P.O.	... ...	each **3d.**
No. 12b	„ „ Air Mail	... ...	„ **3d.**
No. 12c	Telephone Call Box	... ...	„ **4d.**
No. 12d	Telegraph Messenger	... ...	„ **3d.**
No. 12e	Postman	... ...	„ **3d.**
No. 34b	Royal Mail Van	... ...	„ **10d.**

Price of complete set **2/3**

MECHANICAL HORSE AND FOUR ASSORTED TRAILERS



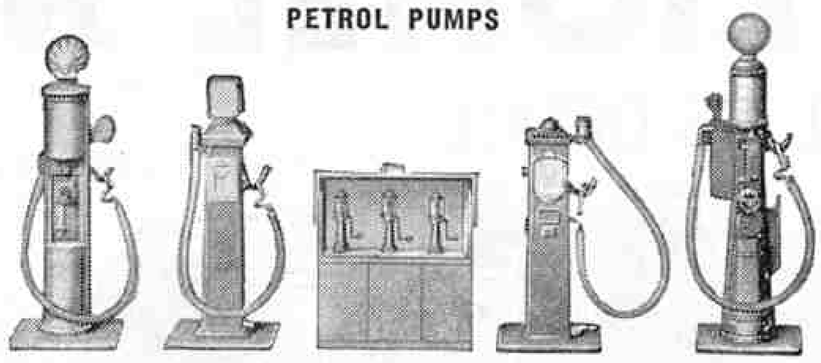
33A 33C 33F 33E 33B

Dinky Toys No. 33
Fitted with detachable rubber tyres.

No. 33a	Mechanical Horse	... ...	each **6d.**
No. 33b	Flat Truck	... ...	„ **6d.**
No. 33c	Open Wagon	... ...	„ **6d.**
No. 33e	Dust Wagon	... ...	„ **8d.**
No. 33f	Petrol Tank	... ...	„ **8d.**

Price of complete set **2/9**

PETROL PUMPS

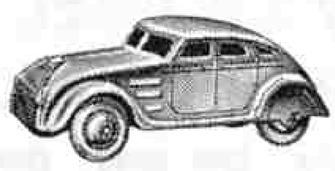


Dinky Toys No. 49
Scale models fitted with rubber hose pipes. Finished in correct colours.

No. 49a	Bowser Pump	... ...	each **3d.**
No. 49b	Wayne Pump	... ...	„ **3d.**
No. 49c	Theo Pump	... ...	„ **3d.**
No. 49d	Shell Pump	... ...	„ **3d.**
No. 49e	Oil Bin (Pratts)	... ...	„ **3d.**

Price of complete set **1/3**

STREAMLINE SALOON



Dinky Toys No. 22h
Assorted colours. Fitted with detachable rubber tyres.
Price **4d.** each

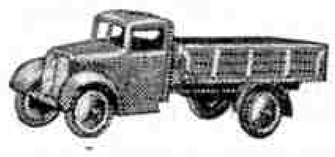
STREAMLINE TOURER

Dinky Toys No. 22g
Assorted colours. Fitted with detachable rubber tyres.
Price **4d.** each

D.H. "COMET" AEROPLANE

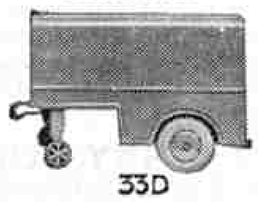
Dinky Toys No. 60g
Scale model of the plane used by C. W. A. Scott and the late T. C. Black in their Australian flight. Price **6d.** each

MOTOR TRUCK



Dinky Toys No. 22c
Assorted colours Fitted with detachable rubber tyres.
Price **6d.** each

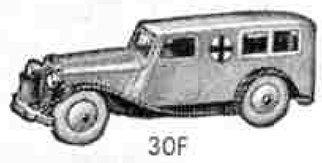
BOX VAN



33D

Dinky Toys No. 33d
Fitted with detachable tyres.
Price **8d.** each

AMBULANCE



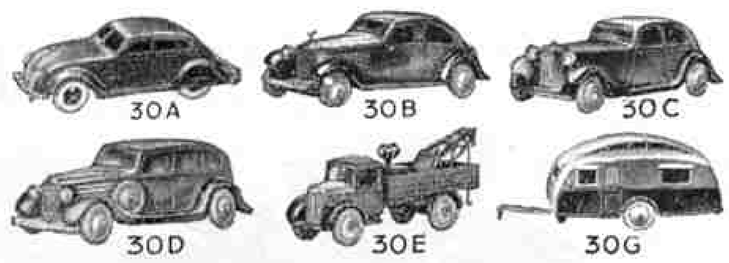
30F

Dinky Toys No. 30f
Fitted with detachable rubber tyres. Finished in grey, with red cross. Silver-plated radiator. Price **6d.** each

BEACON

Dinky Toys No. 47d
Realistic model of the Belisha Safety Beacon.
Price **1d.** each

MOTOR VEHICLES



30A 30B 30C 30D 30E 30G

Dtnky Toys No. 30
Fitted with detachable rubber tyres.
Silver-plated radiators.

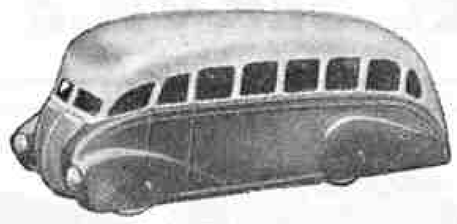
No. 30a	Chrysler "Airflow" Saloon	... ...	each **6d.**
No. 30b	Rolls-Royce	... ...	„ **9d.**
No. 30c	Daimler	... ...	„ **9d.**
No. 30d	Vauxhall	... ...	„ **9d.**
No. 30e	Breakdown Car	... ...	„ **9d.**
No. 30g	Caravan Trailer	... ...	„ **6d.**

Price of complete set **3/11**

SMALL CARS

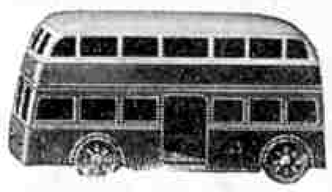
Dinky Toys No. 35 Fitted with rubber tyres
No. 35a Saloon Car each **3d.** No. 35b Racer each **3d.**
No. 35c "M.G." Sports Car ... ... „ **3d.**
Price of complete set **9d.**

STREAMLINE BUS



Dinky Toys No. 29b
Fitted with rubber tyres.
Price **6d.** each

MOTOR BUS

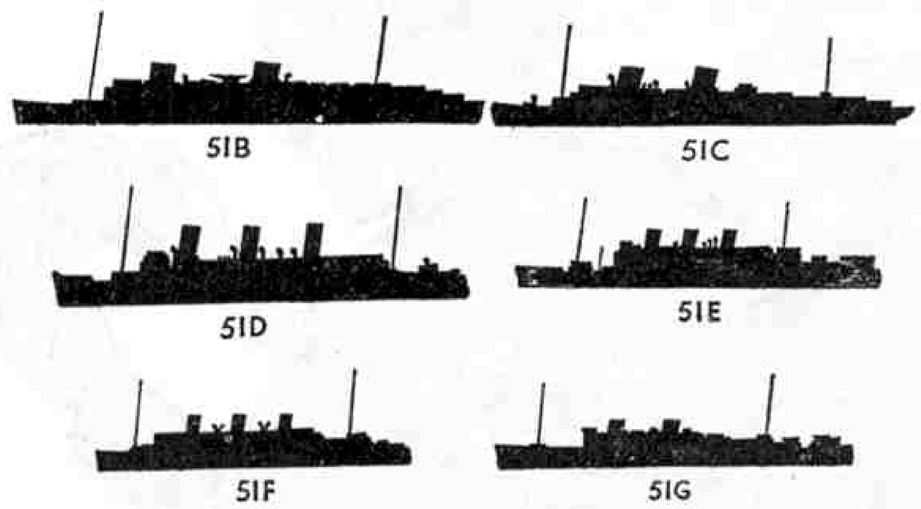


Dinky Toys No. 29a
Assorted colours.
Price **4d.** each

ROBOT TRAFFIC SIGNAL

Dinky Toys No. 47a
(Four face)
Price **3d.** each
No. 47b (Three face)
Price **3d.** each
No. 47c (Two face)
Right-angle or back-to-back. Price **3d.** each

FAMOUS LINERS



51B 51C 51D 51E 51F 51G

Dinky Toys No. 51

No. 51b	"Europa"	... ...	each **6d.**
No. 51c	"Rex"	... ...	„ **6d.**
No. 51d	"Empress of Britain"	... ...	„ **6d.**
No. 51e	"Strathaird"	... ...	„ **6d.**
No. 51f	"Queen of Bermuda"	... ...	„ **6d.**
No. 51g	"Britannic"	... ...	„ **6d.**

Price of complete set **2/11**

MECCANO LIMITED — BINNS ROAD — LIVERPOOL 13

JUST LOOK AT THIS WONDERFUL LIONEL MODEL

WITH ALL ITS DETAIL

MADE IN U.S.A.

THEN WRITE WITHOUT DELAY FOR THE NEW LIONEL CATALOGUE OF ELECTRIC TRAINS WHICH IS BEAUTIFULLY ILLUSTRATED AND ABSOLUTELY FREE!

Lionel Steam Type and Streamline Trains from **32/-** each

LIONEL SERVICE DEPT. (17), 35, Aldermanbury, London, E.C.2

A fascinating building hobby

FOR BOYS AND GIRLS

Dinky Builder Outfits are great favourites with boys and girls. The parts contained in them provide a most fascinating constructional hobby, specially designed for the younger children. These brightly coloured parts are fitted together in a most simple and ingenious manner without the use of any nuts and bolts.

There are four Outfits in the series, Nos. 0, 1, 2 and 3, in all of which the parts are beautifully enamelled in striking colours, giving a distinction to the models that is outstandingly attractive.

No. O DINKY BUILDER OUTFIT

This is an excellent Outfit with which a splendid range of models can be built. The Instruction Folder included gives examples of 40 delightful models. Price 2/6

No. 1 DINKY BUILDER OUTFIT

This fine Outfit contains a varied selection of parts, including a set of four road wheels for constructing miniature wheeled toys, many examples of which are illustrated in the Instruction Manual. These instructions show a total of 56 fine models that any boy or girl can build. Price 4/11

No. 2 DINKY BUILDER OUTFIT

The No. 2 Dinky Builder Outfit contains a comprehensive selection of parts with which all the No. O and No. 1 Outfits models can be built. In addition, the parts in this fine Outfit make possible the construction of six groups of miniature model furniture. Full instructions are given in the Instruction Manual included in the Outfit. Price 7/9

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The Dinky Builder "A" packet contains a useful assortment of Dinky Builder Parts with which Outfits No. O, No. 1, No. 2 and No. 3 may be supplemented. Price 1/-

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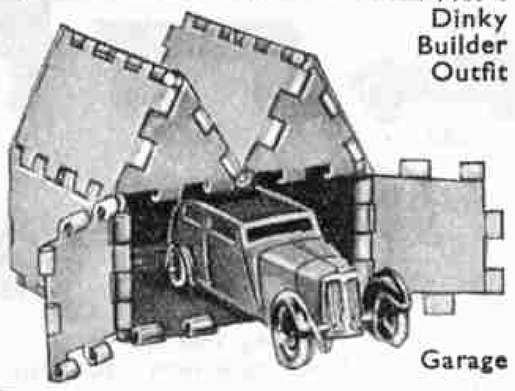

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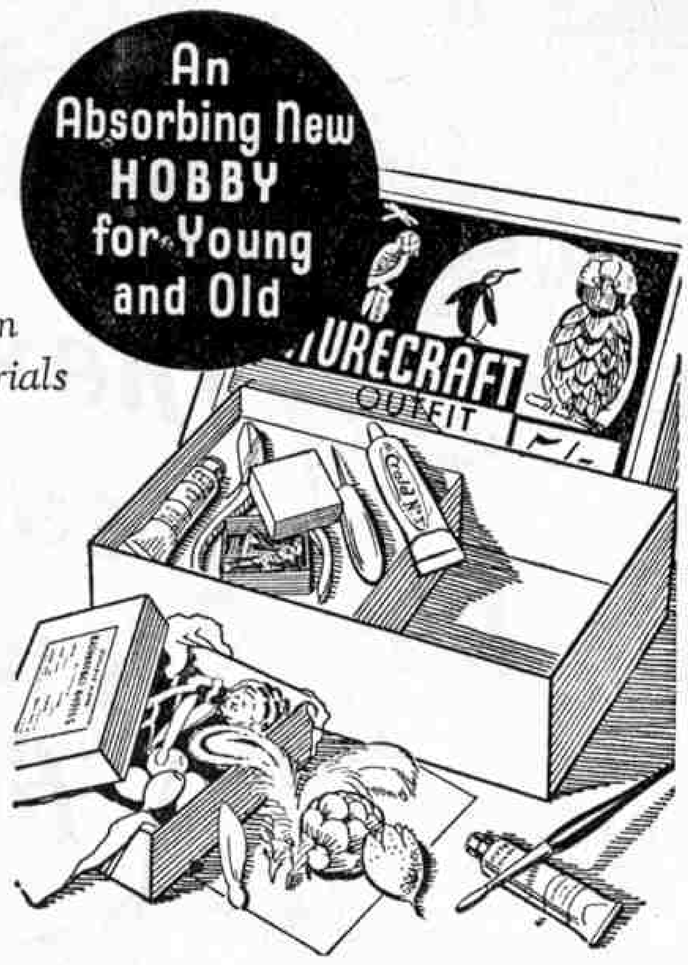

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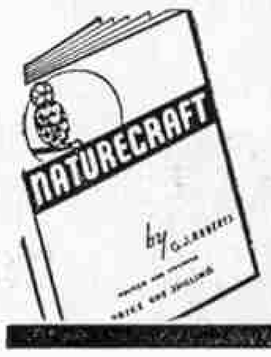

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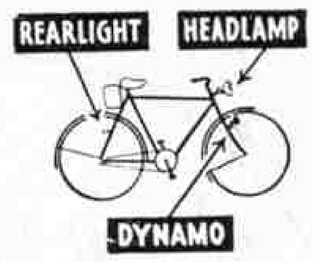

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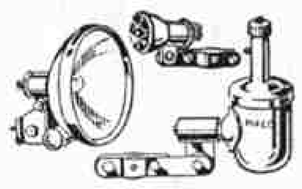

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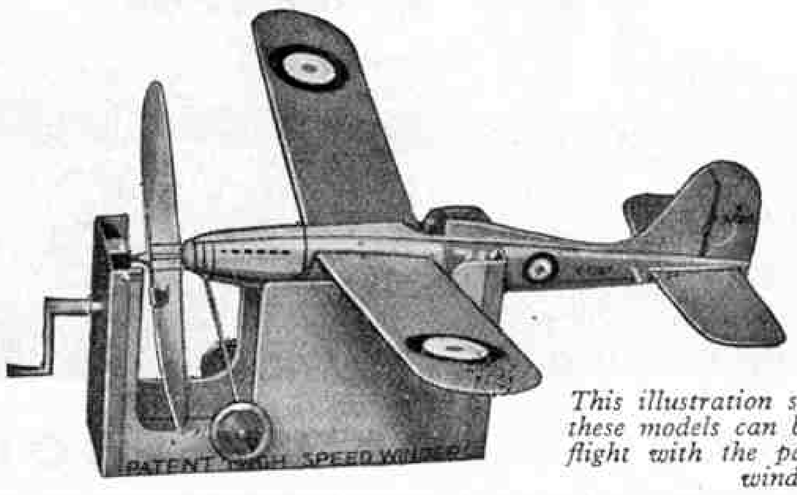

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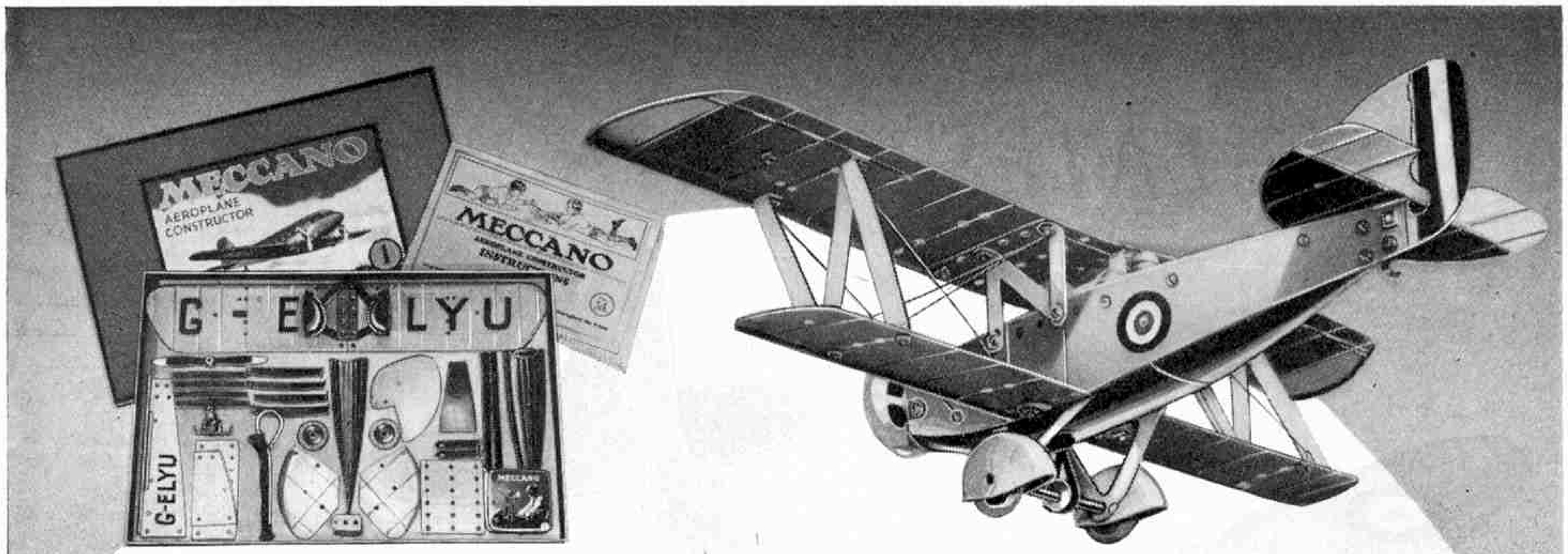

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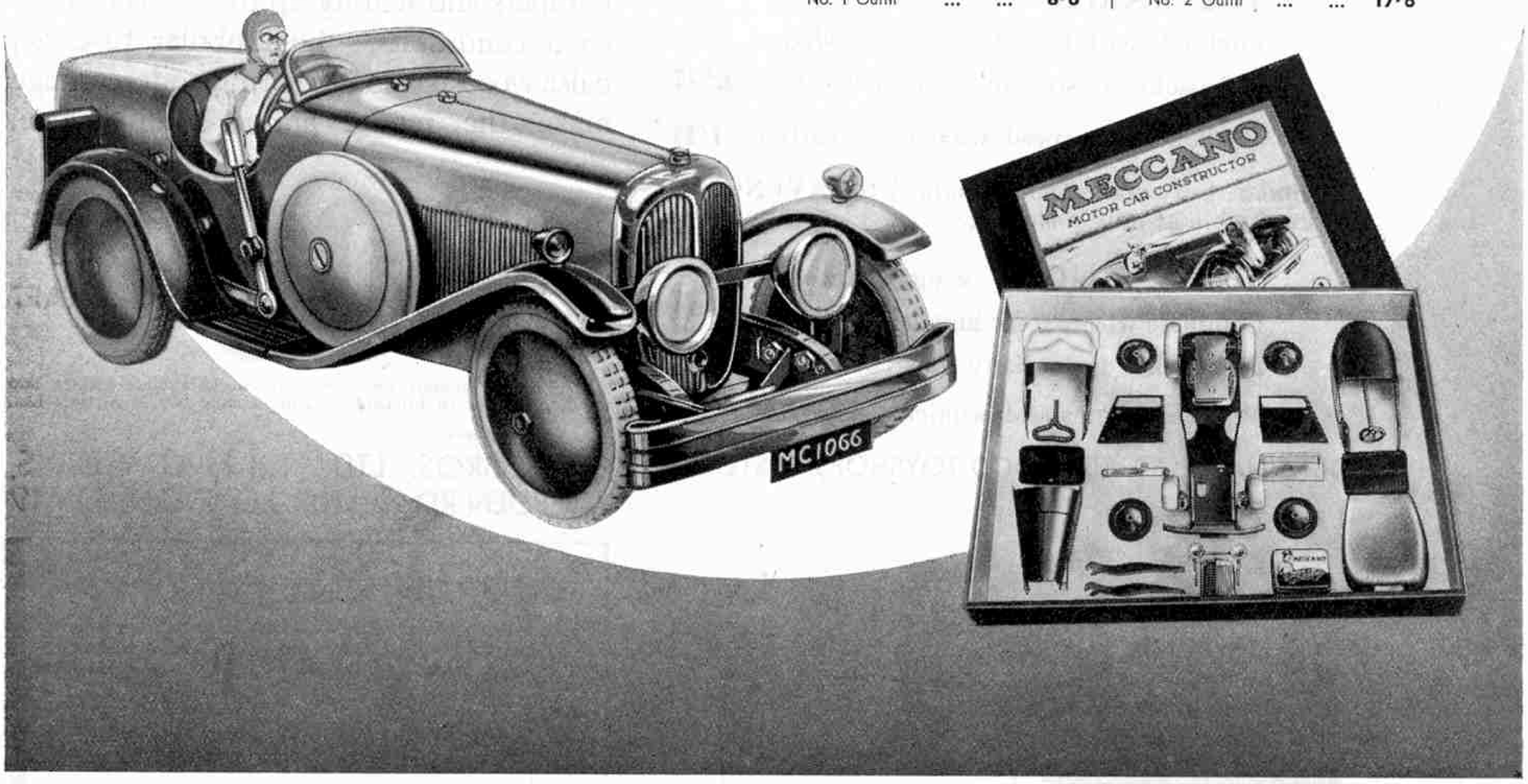

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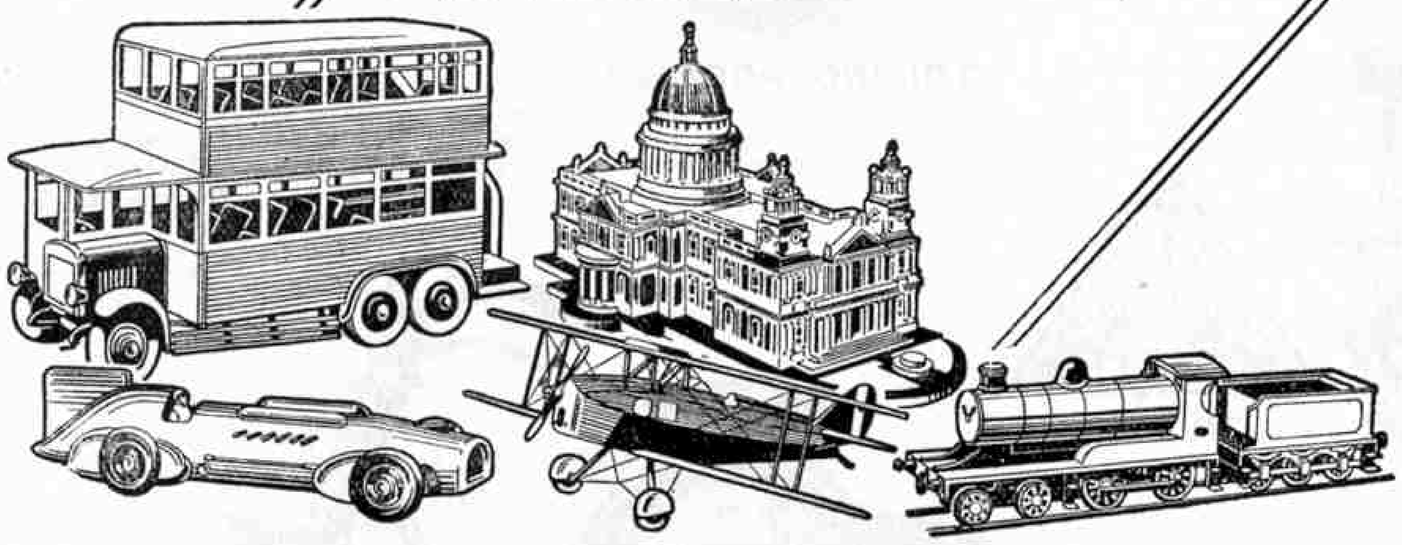

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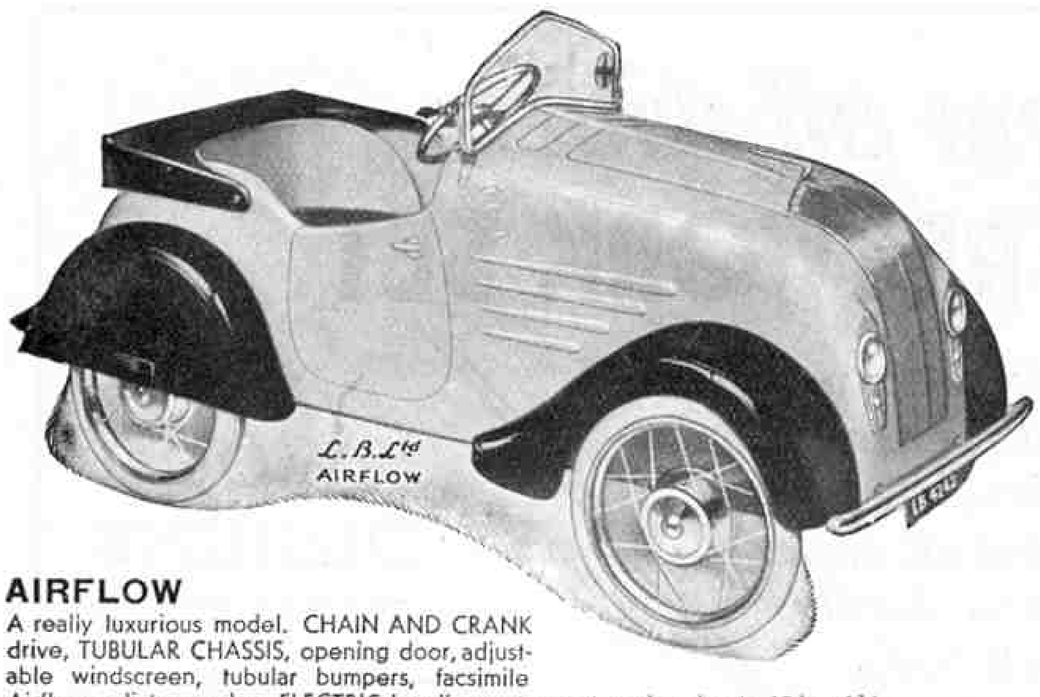

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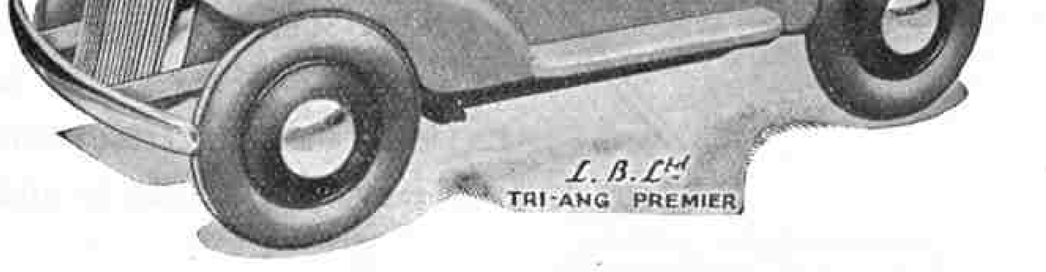

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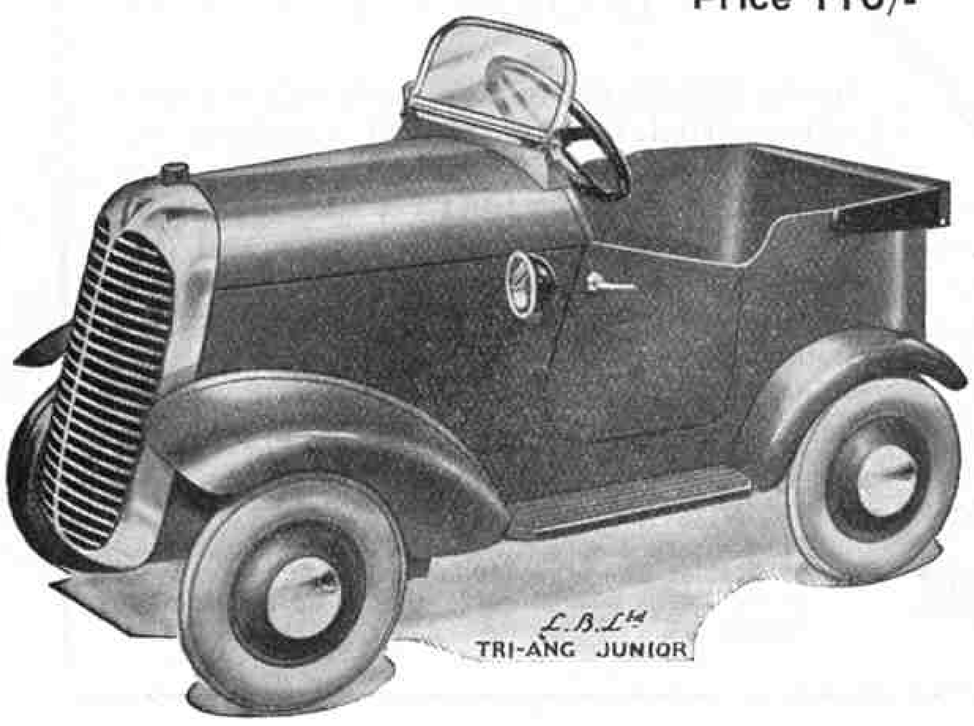

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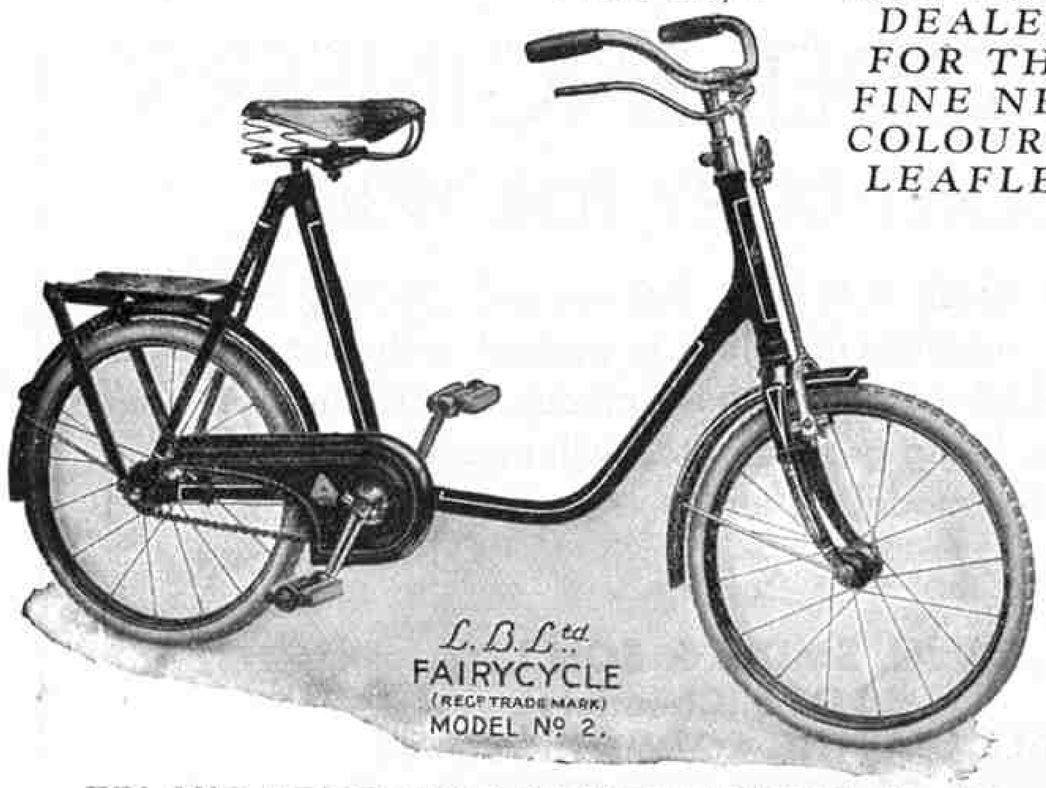

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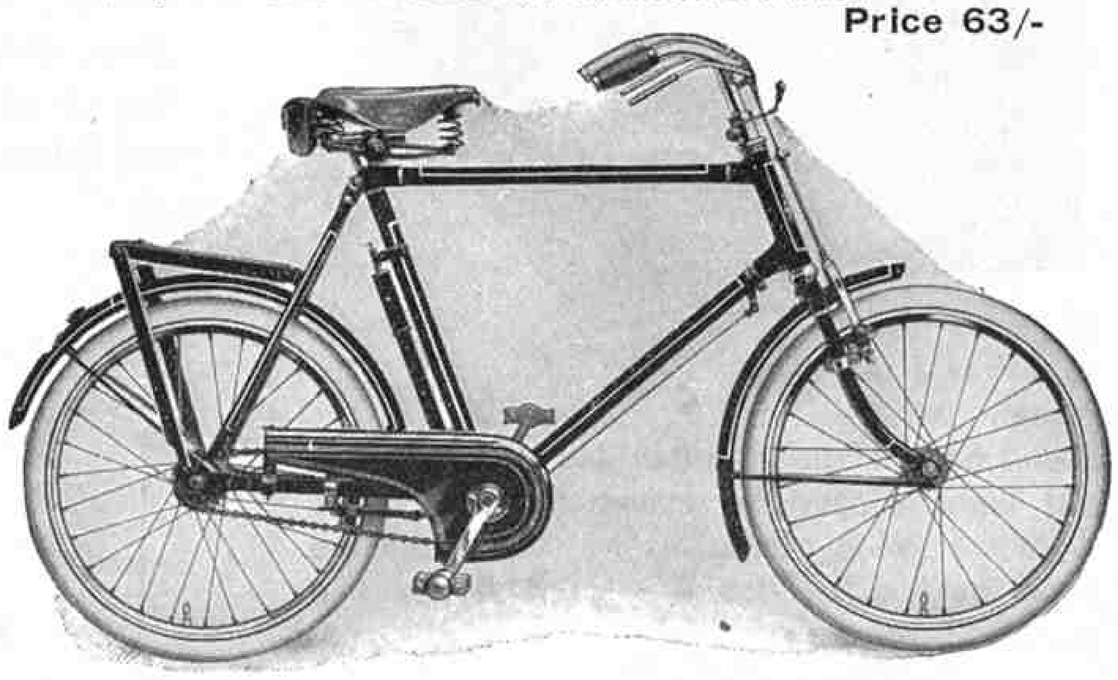

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MECCANO MAGAZINE

Editorial Office:
Binns Road, Liverpool 13
England

Vol. XXII. No. 11
November, 1937

With the Editor

Magazine Veterans

A flood of letters of congratulation followed the appearance last month of the twenty-first birthday issue of the "*M.M.*" I think I have never before read so many interesting letters in so short a time; and although I knew how greatly the Magazine was treasured by its readers, I was surprised to find how many of them were able to tell me that they have in their possession every copy from the first issue. In most cases these are carefully bound and the volumes are in constant use for reference.

I was specially interested to note that Mr. Stewart Wilson, of Morden, Surrey, has all the issues and has every volume bound. Mr. Wilson was for many years leader of the Holy Trinity Meccano Club, Barnsbury, London, N.1, which has the honour of being the first Club in the world to be affiliated with the Meccano Guild. Incidentally, Mr. Wilson tells me that among his greatest treasures is one of the earliest Meccano outfits, which appeared under the name "Mechanics Made Easy" somewhere about 1901. I, too, have a collection of the parts produced during those early days, and it is extraordinarily interesting to compare them with the present Meccano parts.

Another reader, Mr. J. E. Brown, of Frampton, near Dorchester, writes: "As you said that only one reader has written saying that he has all the '*M.M.s*' since the first number, I should like to say that my late younger son John took them from the first number, and since he died in August 1935, I have continued taking them. I have to cycle six miles to Dorchester to get them." Other letters, many of them from readers who have never written to me before, tell similar stories of continued interest in the Magazine. It has been a great pleasure to answer personally these welcome communications.

Chimney or Funnel?

I see that the old argument has arisen again as to whether a steam locomotive has a "chimney" or a "funnel." My own impression is that the term "chimney" is correct, but apparently the question is not quite so simple as that. At Swindon, for instance, the term "funnel" appears to be in use, to some extent at any rate; whereas at Doncaster, where they appear to have a gadget known as a "chimney lifter," the use of the name "funnel" probably would cause surprise.

As usual in a case of this kind, the dictionaries do not help much. One I have before me describes a chimney as "a passage for the escape of smoke or heated air from furnaces." This is alright, but when I turn to the word "funnel" in the same dictionary I find that it means "a tube or passage for the escape of smoke, etc.," which seems to lead in precisely the same direction. I have never heard anyone speak of a ship's "chimney," nor of a factory "funnel"; but there appears to be no reason why these names should not be so used. It seems to be a matter of usage, and I should like to know what my readers think about it. Possibly some of them may dodge the difficulty by suggesting the use of the name "smoke stack," which I believe is used in the United States in connection with locomotives.

A Mystery of Mount Everest

When the first attempts were made to climb Mount Everest, stories were told by the Tibetans of dreadful creatures, half man and half ape, that prowled about the lower slopes of the mountain. The Tibetans called them "the abominable snowmen," and asserted that they were capable of killing large animals like the yak with a blow of the fist. At first these creatures seemed to be mere legend, but the members of successive expeditions have been surprised to find mysterious footprints at a height of 20,000 ft. These have now been photographed and measured. They were nine inches wide and many feet apart, and must have been made by some entirely unknown animal, possibly a bear that is much larger than the grizzly of North America.

There is no reason why Everest should not hold a secret of this kind, for there are many parts of the world where mysterious creatures may lurk. There have even been rumours of giant dinosaurs in the forests and swamps of Central Africa, and tales of other survivals of past ages have reached us from the unexplored jungles of South America. No doubt it was stories of this kind that inspired Conan Doyle's famous book "*The Lost World*," which tells of dinosaurs and pterodactyls living on a great plateau isolated from the rest of the world by its precipitous sides. There are similar plateaux on a smaller scale in the Grand Canyon of the Colorado. As described on page 658, these are now being explored.

Our Special Christmas Issue

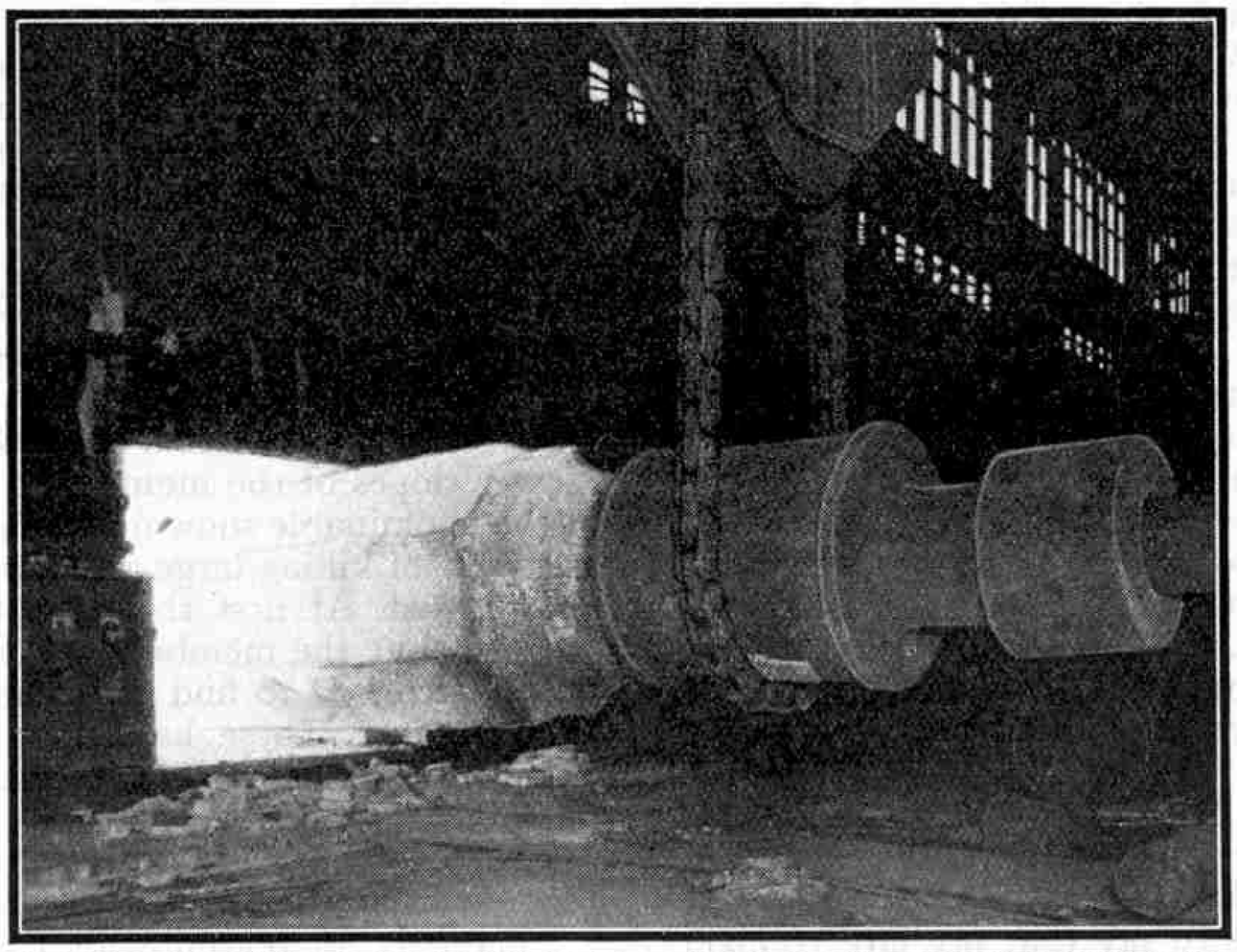
The Christmas issue of the "*M.M.*" will be published on 1st December. As usual it will be specially enlarged, and will be full of interesting articles and other features, but there will be no increase in price. This issue is sure to be sold out very early. Every reader therefore should make sure of his copy by placing an order now with his usual dealer or newsagent, and he should also advise all his friends to follow his example.

The Making of Steel

Casting Ingots of More than 200 Tons

THE melting department at the Vickers Works of the English Steel Corporation Limited has facilities for making ingots over 200 tons in weight. These ingots are used for the production of the huge forgings required for chemical and oil engineering processes, super power stations, and marine, electrical and general engineering work, and our cover shows the tapping of a 60-ton acid open hearth furnace in readiness for casting one of them. The molten steel is seen running down the launder, or trough, from the furnace to the ladle, which is lined with firebrick and is suspended from a 200-ton crane. From the ladle the steel is poured into the ingot mould. It runs through a small nozzle in the bottom of the ladle, and pouring is controlled by means of a stopper rod.

In casting ingots of exceptional weight, say over 150 tons, it is necessary to use the steel from three or more 60-ton open-hearth furnaces. In this case, after tapping the first furnace, the ladle is placed over the ingot mould, which is below ground level, and the steel is allowed to flow in. In the meantime a second ladle filled with steel from another furnace is brought above the first. The steel from the second ladle is then poured into the first, and the third ladle is dealt with in a similar manner. This method of pouring ensures a steady flow of steel from the first ladle into the ingot mould, which is rotated slowly during the casting, thus giving complete control over casting conditions.



An ingot weighing 136 tons being withdrawn from a reheating furnace. We are indebted to the English Steel Corporation Limited for the illustrations to this article.

The melting chamber of an acid open-hearth furnace is rectangular in shape and is built of silica bricks, which are highly refractory. It is supported on steel girders, bound by steel plates and other members, held in position by tie-rods, and the hearth or bath upon which the steel is made is composed of silica sand, which is fused to give a homogeneous bottom.

Below the melting chamber, and connected to it by separate up-takes, are four chambers known as regenerators, two at each end of the furnace. The two inner ones are larger than the others, and are air regenerators; the two outer smaller ones are gas regenerators. There are also slag chambers, or pockets, vertically below the passages from the furnace, in which finely-divided materials mechanically carried over by the stream of gas from the furnace are collected. These materials otherwise would pass into the regenerators, and react with the bricks they contain or choke the passages through them, a combination of circumstances that would shorten considerably the life of the furnace.

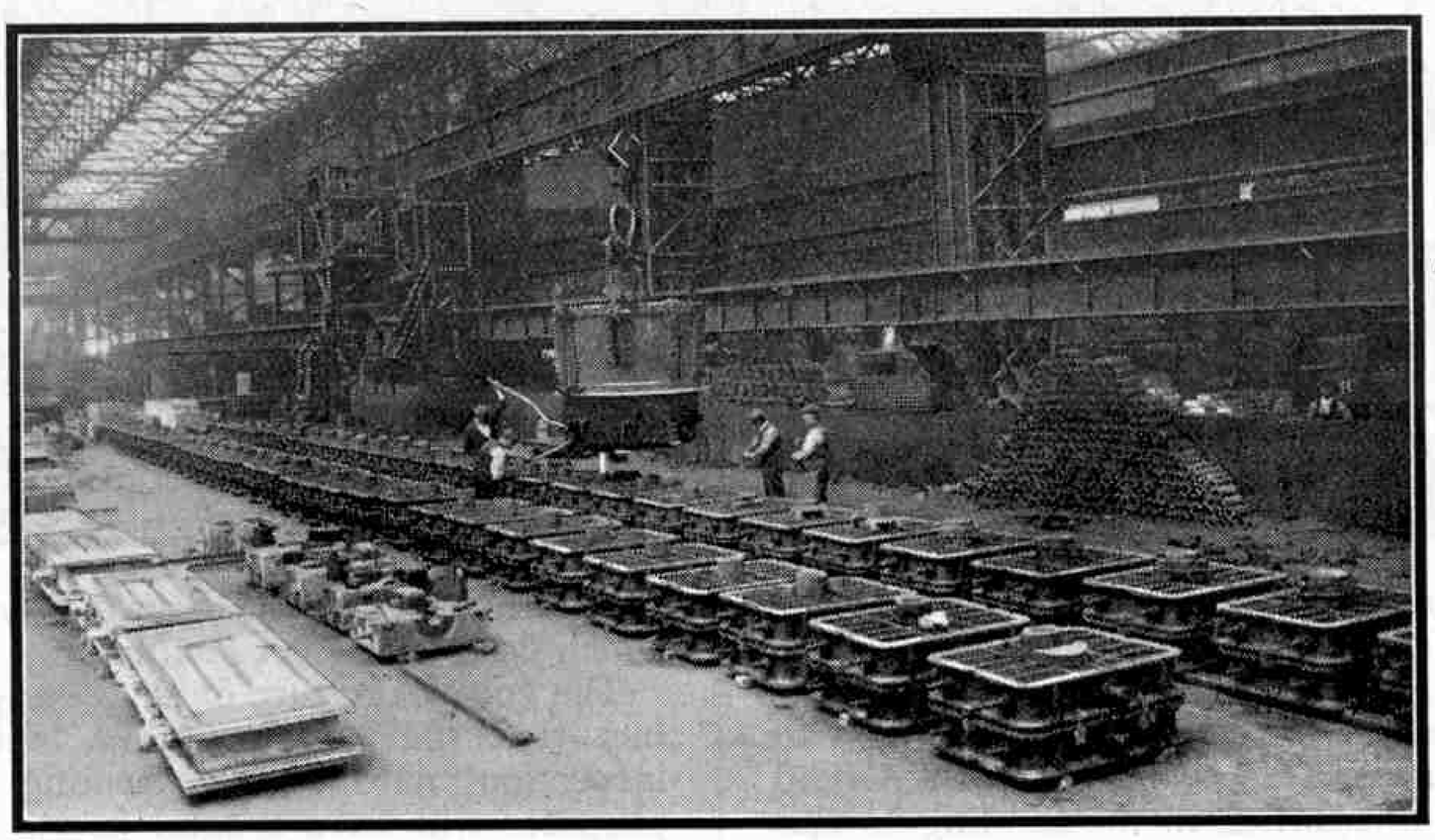
The regenerators contain thousands of bricks, which are arranged to form a checker work exposing a large area of surface, and containing many zig-zag passages through which the gases must pass on their way to and from the melting chamber. By a suitable arrangement of valves and flues, the producer gas used as fuel and air are conveyed to entrances at the bottoms of their respective chambers at one end of the furnace. They pass through the hot checker brickwork, where they are pre-heated, and through the up-takes, to enter the melting chamber through separate ports at one end. The gas and air mix in the furnace and burn. The flame passes across the hearth, and the products of combustion make their exit through the gas and air ports at the other end and so into the regenerators there, heating the checker brickwork before finally passing out to the chimney. The direction of the gas and air is reversed at frequent intervals with the object of obtaining suitable checker temperatures.

Pre-heating the gas and air on these lines allows for a more effective heat in the furnace than would be the case if combustion of air and gas were to take place in what is generally understood to be the normal manner. The reversal of the gas and air at intervals has a cumulative effect, giving higher and higher temperatures in the furnace, and eventually it would be possible to melt the furnace itself. The temperature is controlled by the melter, who judges it by the appearance of the furnace, the flame and the condition of his bath, which is indicated by samples taken at frequent intervals.

The producer gas generally used as fuel in acid-hearth furnaces consists chiefly of nitrogen, carbon monoxide and hydrogen, with a smaller proportion of hydrocarbons. The nitrogen is a non-combustible and therefore of no value. The gas is made in circular producers of steel plate lined with fire brick. A current of air containing steam is led in at the bottom, and coal is fed from the top automatically. The gas evolved is led off through flues to the valves leading to the furnace.

The term "acid" hearth demands a little explanation. The element silicon combines with oxygen to give silicon oxide, which is known as silica. This is familiar in the form

of silica sand. Ganister and silica bricks are also very largely made up of silica. Silica is classed by the chemist as an acidic oxide, and the furnace is known as an acid furnace because the hearth of the melting chamber is lined with silica sand. In the same way the oxides of magnesia and lime are known as basic oxides, so that when the hearth is lined with these oxides, the process is known as the basic open-hearth process.



In the foundry casting bay. Molten steel is pouring through a small nozzle in the bottom of the ladle into one of the boxes in which the castings are made.

In order to start a furnace from the cold, a coal fire is placed on the hearth and the valves are opened to admit cold air and gas. The fire plays the same part as a match applied to the mixture of air and gas issuing from an ordinary Bunsen burner. It is required only until the temperature of the melting chamber and regenerators is high enough to raise the gas and air to a temperature at which they will ignite spontaneously. Special precautions are necessary when warming up a furnace and introducing gas for the first time, as there is danger of explosion.

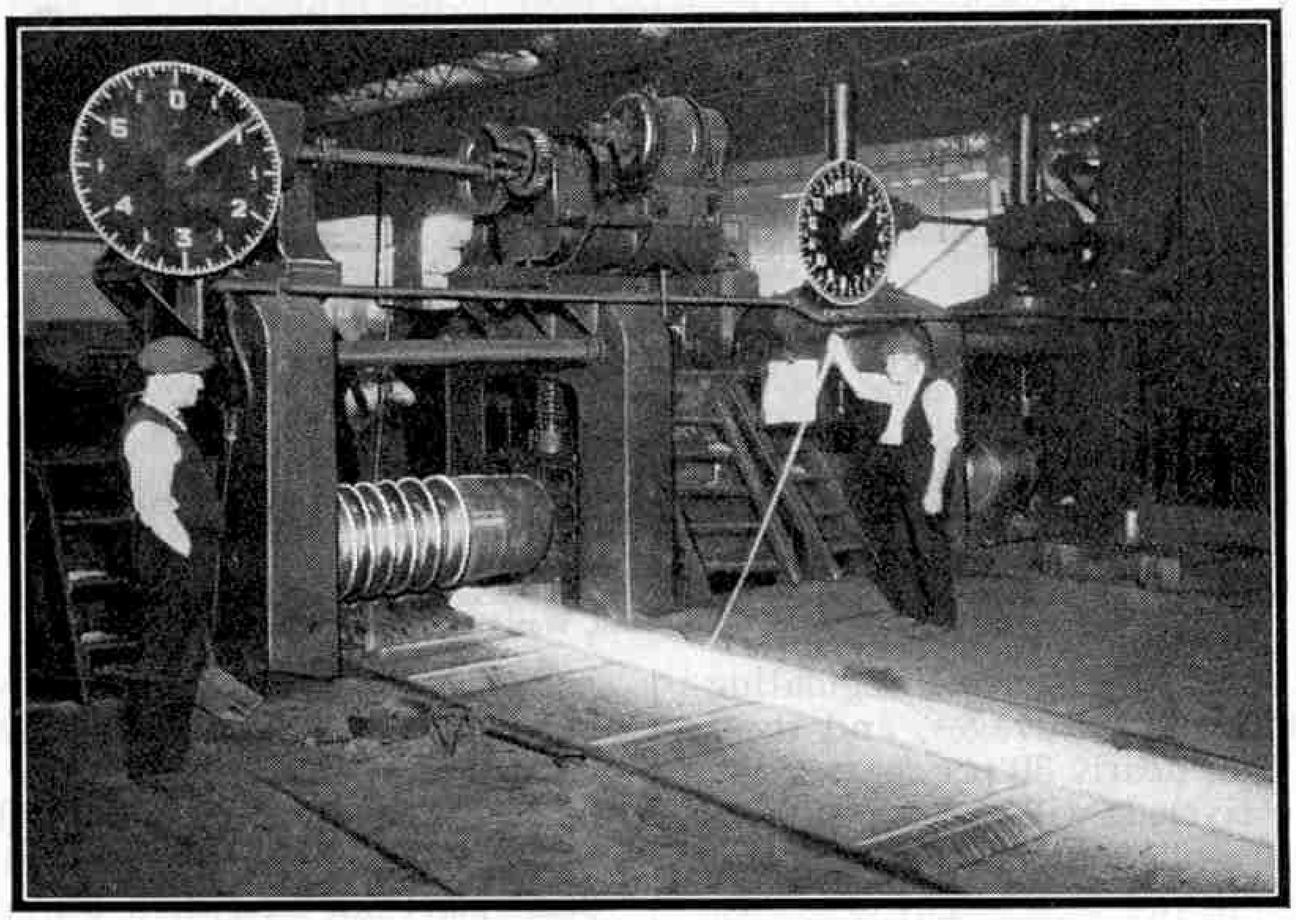
When the melting chamber is new, a bricklayer leaves the hearth outlined in silica brick. The coal fire is put in the furnace in order to dry it, and when this process is complete, gas is admitted and the temperature raised cautiously for a few days. When the newly-lined furnace is hot enough, dry silica sand is glazed or fritted on to the hearth in successive thin layers. This operation requires great care, as a faulty hearth means time lost between charges, or sometimes the complete failure of the hearth, leading to the loss of the charge and damage to the structure.

The hearth is shaped so that from every direction it slopes towards the tap hole. When it is completed, which takes from five to seven days, the tap hole is cut and closed with a mixture of crushed coke and sand, backed with clay or ganister. Before charging on a new hearth, slag from previous acid charges is crushed and spread over it. The slag melts and sinks into the hearth, making it more dense and less liable to absorb iron. The furnace is now ready to receive its first charge.

The raw materials used in an acid open-hearth furnace are decided by the quality of the steel to be produced. In the working of this type of furnace, sulphur and phosphorus are not removed, and it is therefore essential that the percentage of these elements in the raw materials shall be very low in order to produce a good quality acid steel.

The base materials used are pig iron and scrap, the proportion of the former ranging from 35 to 60 per cent., according to circumstances. These form the charge for carbon steels. An electric overhead furnace charger is used for feeding in the raw materials. When the charge has been thoroughly melted, iron ore and small limestone additions are made as circumstances demand, their purpose being to remove carbon, silicon and manganese, and to give the required degree of refining. The finishings for these steels, which are added during the final stage of the working, generally consist of alloys of silicon and manganese, or ferro-silicon and ferro-manganese.

For alloy steels, similar proportions of pig iron are used. The scrap is very often alloy steel, however, and further additions of alloys are required. In the case of a nickel-chrome molybdenum steel, ferro-silicon or silico-manganese is added, as in making carbon steels, but raw nickel, ferro-molybdenum and ferro-chromium are added at stages during the working in order to bring the steel to the analysis specified.

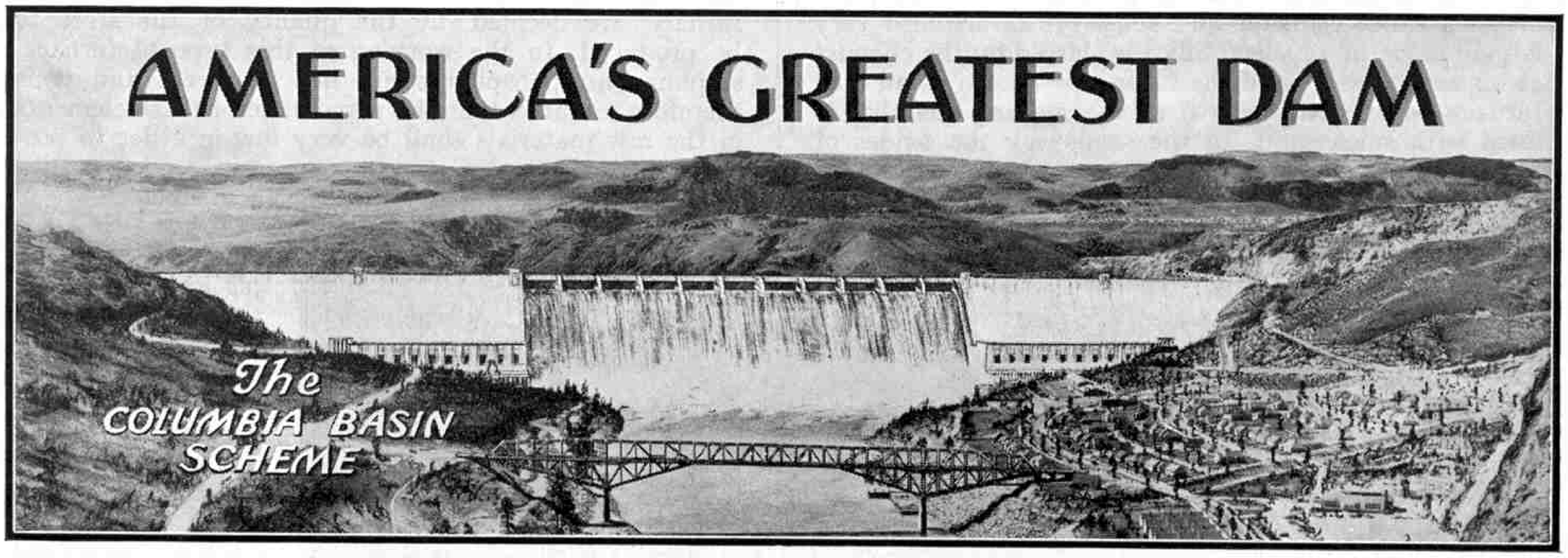


A hot bar passing through the finishing rolls of a 28 in. rolling mill. The dial shows the distance through which the top roll rises and falls, the bottom roll being fixed.

At frequent intervals, small samples are taken from which the condition of the bath is determined. Some of the samples are drilled and analysed, and the results obtained determine the quantities of finishing alloys to be added. The furnace is ready for tapping when the bath has been brought to the condition required, and the steel to the required analysis.

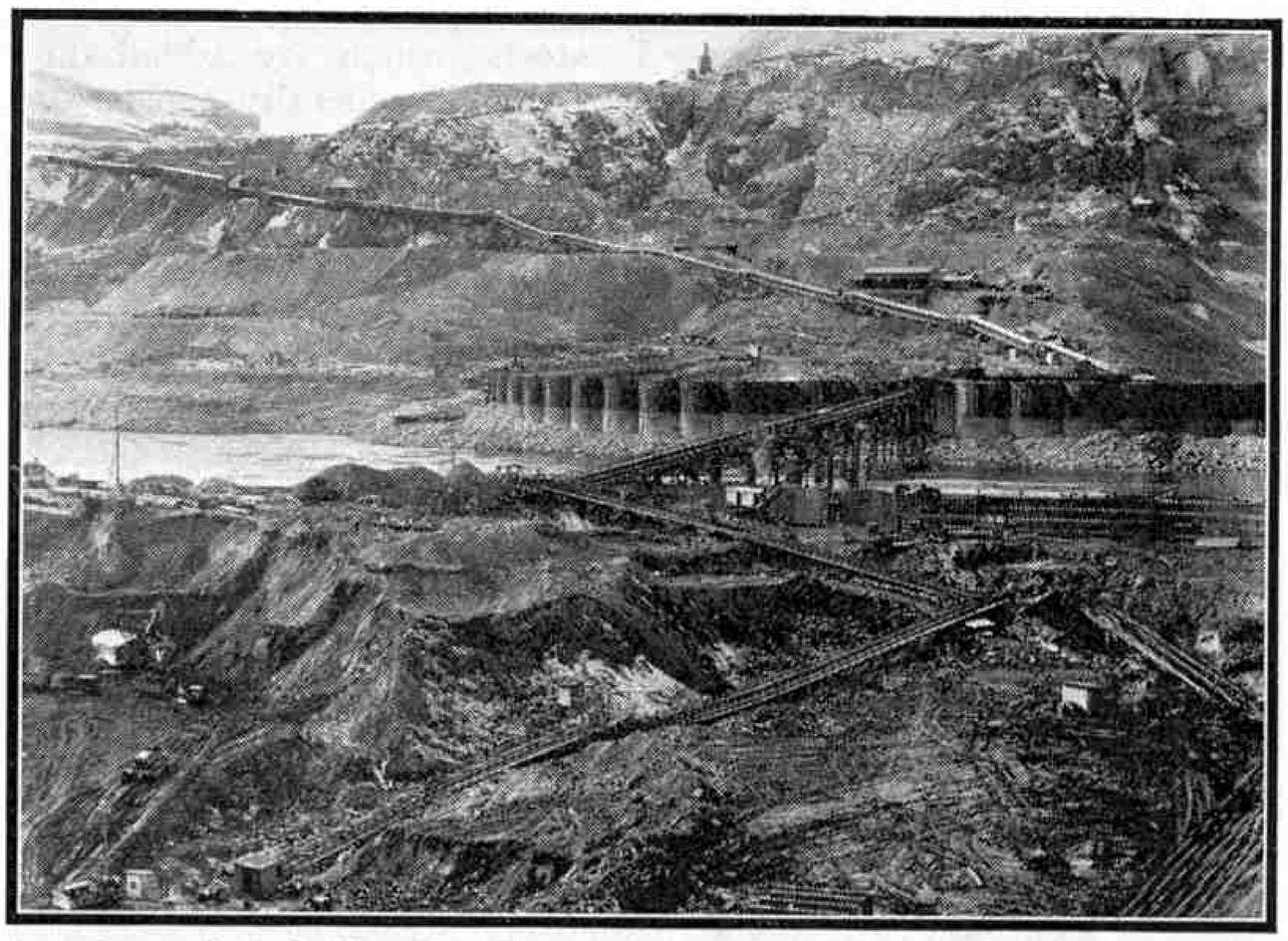
The ingots produced vary in weight from 1 ton up to over 200 tons. The smaller sizes, say up to 35 or 40 cwt., are taken to the Rolling Mill. The larger ones are used for forgings, the medium ones being hammered and the largest forged under a press.

For the information in this article we are indebted to the English Steel Corporation Ltd.



AMERICAN engineers have carried out some of the world's greatest feats of constructional engineering, but a colossal dam that they are now building across the Columbia River in the State of Washington will dwarf all their previous enterprises. This is known as the Grand Coulee Dam, and the illustration in the heading on this page shows what it will look like. It will be three times the size of the Great Pyramid of Egypt, and indeed will be the largest structure of any kind ever made by Man.

The Grand Coulee Dam forms only a part of a great project planned by the United States Government to control the water of the Columbia Basin. Although less famous than such rivers as the Mississippi and the Colorado, the Columbia has the second largest flow of all rivers in the country, and is the largest potential source of hydro-electric power. Between the Canadian border and the Pacific Ocean it falls through some 1,300 ft., and the entire scheme includes the building of 10 dams to make use of 92 per cent. of this fall.



An early stage in the building of the Grand Coulee Dam, showing the mile long conveyor used to remove the excavated material. The illustrations are reproduced by courtesy of the United States Bureau of Reclamation, Washington.

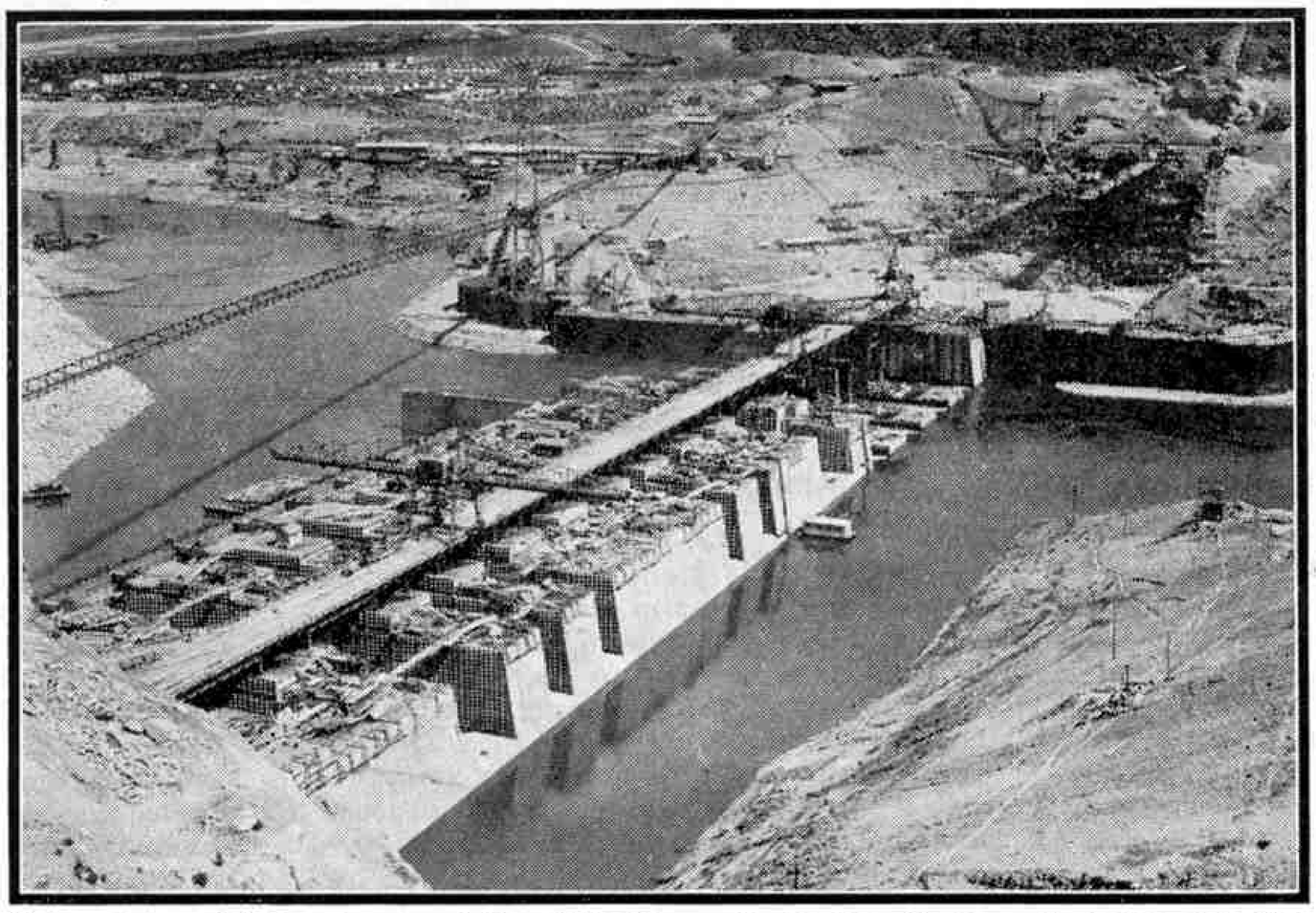
The Grand Coulee Dam will be the key structure in this scheme, regulating the supply of water to the other barrages, and itself dealing with a fall of 355 ft., or nearly 30 per cent. of the total drop in the level of the river. It will be 3,000 ft. long and 500 ft. thick at the base, and about 4,300 ft. long and 30 ft. thick at the crest. It will rise to a height of 550 ft. above bed rock, and therefore will not be as high as the 727 ft. Boulder Dam across the River Colorado in Arizona. In almost every other respect it will be much larger, however. For instance, it will contain 12 million cu. yds. of concrete, or more than three times the amount required for the Boulder Dam. Behind it will be formed a mighty reservoir 151 miles long, with an average width of 4,000 ft. and a maximum depth of 375 ft. This artificial lake will be the longest of its kind in the world. It will extend to the Canadian border, 151 miles away, and an arm 32 miles long will be formed on the Spokane River, which flows into the Columbia.

The colossal nature of the enterprise is shown by the fact that the galleries to be built into the Dam for inspection, gate control, cooling, drainage and other purposes will have a total length of eight miles. More than 1,200,000 cu. ft. of water per second will be able to pass over its crest, a volume more than three times the greatest recorded flow of the river. This will pour over a spillway 1,650 ft. long in the central section of the Dam, and in addition there will be three sets of 20 outlets controlled by gates $8\frac{1}{2}$ ft. in width. The turbines of the power station to be erected at the foot of the Dam also will serve to regulate the water level in the reservoir, for when working at full capacity they will pass 81,000 cu. ft. per second.

The enormous volume of water passing over the spillway will plunge down the face of the Dam into great curved steel buckets placed to receive it, in order to avoid the erosion that would take place if the bed of the river were pounded by a waterfall nearly 400 ft. in height. It is estimated that when the spillway is passing its maximum flow the energy of the falling water will be approximately 32,000,000 h.p.

The Grand Coulee project has been undertaken principally for irrigation purposes. It will serve a vast area of more than a million acres of very fertile land lying in the Big Bend Country, to the east of the great curve of the river. In its present arid condition this land is unproductive and of little value, but when supplied with water it will produce a great variety of crops and will provide homes for a large number of people. The Dam also will be the source of the world's largest supply of electrical energy. Part of this energy will be used for pumping and other purposes, and the States of the north-west will provide a market for the remaining power.

The hydro-electric station will be built in two separate and similar parts, one on each side of the river. They will be about 765 ft. long and 112 ft. wide, and their height above their lowest concrete foundations will be 292 ft. They will be made watertight to a point several feet above the maximum flood level. In each power house nine main generating units will be installed, each driven by a 150,000 h.p. hydraulic turbine. The output of the plant is expected to be 1,890,000 kW, equivalent to 2,520,000 h.p., and this will surpass by nearly 800,000 h.p. the output of the hydro-electric power plant at Boulder Dam. Water will be carried through the Dam to the turbines by 18 steel penstocks, each 18 ft. in diameter, that are embedded in the concrete itself.



The partly-completed western foundation of the Dam, with the Columbia River flowing through. The river is shown diverted from its normal course to allow excavation and other work to be carried out.

In order to follow the constructional work involved in the Grand Coulee project, and to understand how the irrigation scheme will work, it is necessary to go back many thousands of years in the story of the Columbia River. At one time this flowed directly from the western slopes of the Rockies to the gap in the Cascade Mountains through which it reaches the Pacific. Vast floods of lava from fissures in the Earth's crust pushed it out of this channel, and forced it right up against the granite rocks of the Cascade Mountains, so that it made a great bend. In this new position the river gradually cut out for itself a mighty canyon, which in places is a mile wide and 1,600 ft. deep. At the site of the Grand Coulee Dam there are granite rocks on both sides of the river, and these will form the foundation and abutments of the structure. The lava flows have weathered away into a very fertile soil.

Landslides that threatened an excavation were prevented by the frozen earth dam shown above. Pipes through which frozen brine was circulated can be seen projecting above the dam.

The Columbia River was again displaced from its course thousands of years later, during the Great Ice Age, when glaciers coming down from the north blocked the gorge. Water then gradually piled up behind the icy barrier, and eventually overflowed the southern rim of the gorge, cutting a new channel at right angles to its former course. The canyon it formed was 50 miles long and from two to five miles wide, and at one point in it the river plunged over the brink of a precipice more than 400 ft. high, forming an immense waterfall three miles across and with a volume 100 times that of Niagara.

Eventually the ice receded. The Columbia River returned to its old channel, and the canyon was left high and dry, with only a few scattered lakes to show that it had once formed the bed of a mighty river. This canyon is known to-day as the Grand Coulee. It opens out into the valley of the Columbia more than 600 ft. above the level of the river, and the engineers building the Dam are planning to make good use of it.

The Dam itself will rise at the exact point where the ice barrier once blocked the gorge of the Columbia, and it will bring about a similar result. The lake behind it will not rise to the height of the prehistoric river, however, but will be 295 ft. lower. The river therefore will not overflow into the Grand Coulee, and this will be filled by pumping water into it from the lake 295 ft. below. The ancient canyon thus will be converted into a great storage lake 23 miles long, and in some places 880 ft. deep. The rock walls of the Grand Coulee will form the sides of the reservoir, and its ends will be closed by earthen barriers 90 ft. in height. The pumps that will lift the water into it will derive their power from the station at the Dam, and will be capable of raising nearly 450 tons of water a second. Later the water of the Grand Coulee Reservoir will flow 11 miles southward in a canal leading to the area over which it will be distributed through smaller channels.

Those who suggested, 21 years ago, that the Columbia could be dammed in order to supply the thirsty farms with water were laughed at. To-day the structure they dreamed of is rising, in spite of the immense engineering difficulties and the high cost, which is greater than that of the Panama Canal. This outlay will be amply repaid, for when the project is completed it will bring prosperity to thousands of people and add greatly to the country's wealth. How the work is being carried out will be described in a further article that will appear in next month's "*M.M.*"

Isle of Man Air Lines Re-organised

The air services operating between England, Northern Ireland and the Isle of Man were until recently provided by the Manx Airway Section of Railway Air Services, on behalf of the L.M.S., the Isle of Man Steam Packet Company, and Blackpool and West Coast Air Services Ltd., a subsidiary of Olley Air Services Ltd. These three companies have now merged their interests in these air routes, and have become associated with Isle of Man Services Ltd., the company holding the lease of the airport at Ronaldsway, Isle of Man. This company is now operating all the internal air services to and from the Island.

The growth of air travel to the Isle of Man is shown by the fact that from January to August this year 18,000 passengers were carried to and from the Island by the Manx Airway and Blackpool and West Coast Air Services. On the Saturday before August Bank Holiday these two companies between them flew 90 trips and carried a total of 600 passengers.

Aerial War Against Mosquitos

A campaign is being waged against malaria-breeding mosquitos in the Tennessee valley of the United States, and aeroplanes are being employed very effectively to drop chemicals that destroy mosquito eggs and larvæ. It has been found that with a single aeroplane as much work can be accomplished in one hour as two men operating from boats would do in a fortnight.

America Regains International Speed Record

The Women's International Speed Record was recently regained for the United States by Miss Jacqueline Cochran, a well-known American airwoman. She flew over a two-mile course at Wayne County Airport, Detroit, and averaged 293.05 m.p.h. on four successive trips. Her fastest trip was made at a speed of 304.6 m.p.h. She used a Seversky monoplane fitted with a Pratt and Whitney "Twin Wasp" engine.

The previous record was 276.53 m.p.h., and was set up in 1934 by Mlle. Helene Boucher, of France.

Survey Flight in Australian Desert

A party of Queensland business men recently made a flight from Brisbane to the remote Petermann Ranges in Central Australia to explore the inaccessible desert territory with a view to its possible exploitation from a gold-mining standpoint. The prospectors were flown in a Qantas Empire Airways' aeroplane to a point in the Ranges that afforded the nearest approach by air to the region to be surveyed, and the party then proceeded by camel team. The aeroplane was employed to keep in daily touch with the team, and to drop additional food supplies as required.

The party were away from Brisbane just over 30 days, only six of which were occupied in flying to and from the Petermann Ranges, and their flight covered 5,195 miles. The survey would have taken many weeks to carry out, if only surface transport had been employed.

Solo Flight from Australia to South Africa

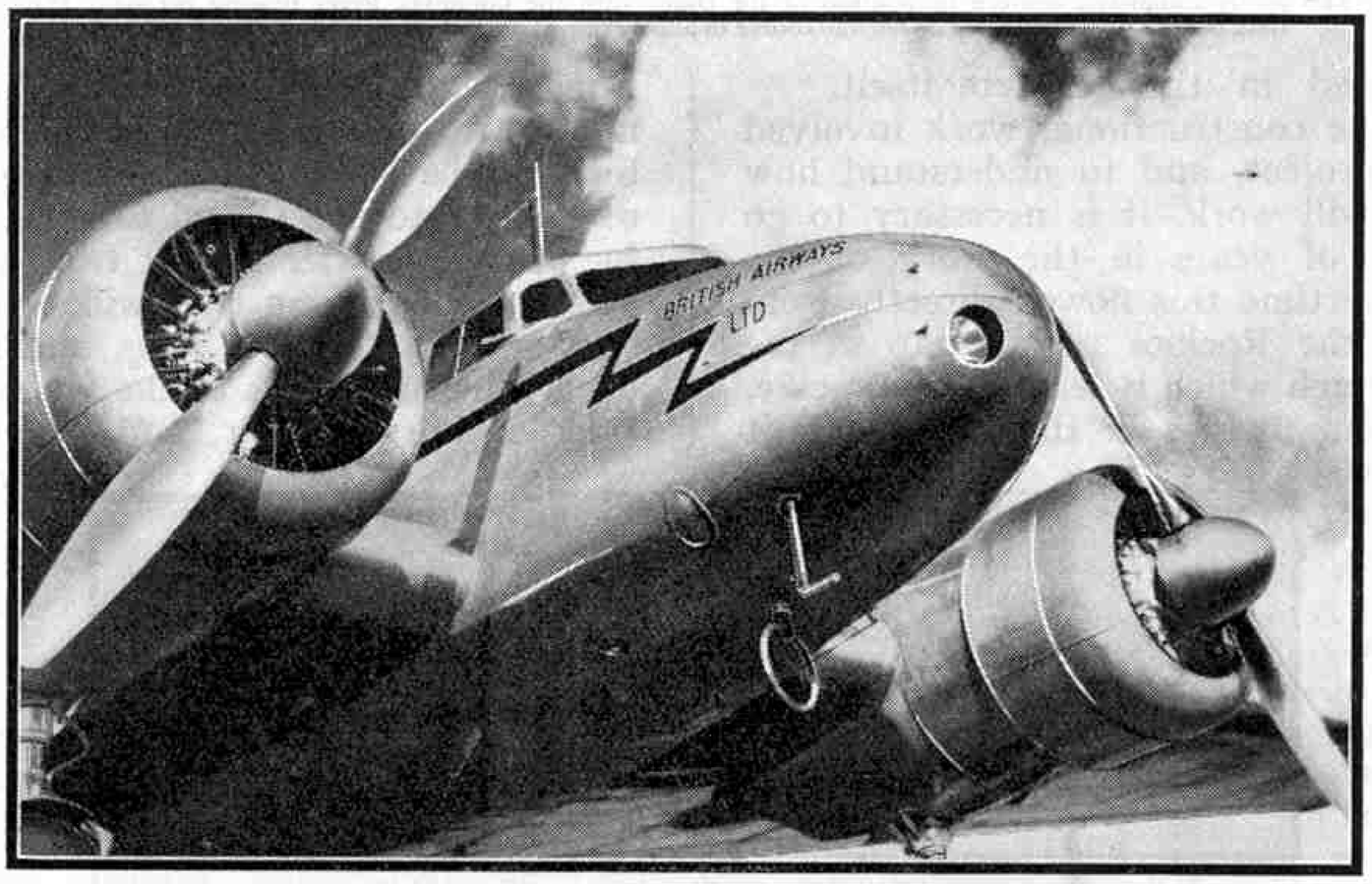
Mrs. Dolores Bonney, an Australian airwoman, recently completed an interesting solo flight from Darwin, in Australia, to Capetown, South Africa. She flew a Klemm 32, a German type of three-seater low wing monoplane. No attempt was made to set up records, and the 18,000 mile flight took nearly four months. The countries visited on the way included Java, Burma, Siam, India, Egypt, the Sudan and East Africa.

A European Air Freight Line

A company to operate fast air freight services between London and the principal European cities has been formed in England under the title of International Air Freight Ltd. Curtiss "Condor" biplanes with two 680 h.p. Wright "Cyclone" engines have been chosen to fly the services. This type of American air liner weighs just over eight tons fully loaded, and of this total over two tons is payload. Its top speed is about 170 m.p.h.

The first service to be started by the new company operates between Croydon Airport and Schiphol Airport, Amsterdam. There are two trips daily in each direction from Croydon at 5.30 a.m. and 12 noon, and from Schiphol at 8.45 a.m. and 3.15 p.m. Each flight takes two hours. Collection and distribution facilities have been organised in the London area and at Amsterdam.

The absence of passengers relieves the service from many restrictions as to the type of freight that can be carried. Considerable traffic in perishable and fragile goods is anticipated. When the service to Holland is well established, another will be started, and it is expected that this will be to Belgium.



An unusual view of one of the five Lockheed "Electra" air liners of British Airways Ltd., by whose courtesy this photograph is reproduced.

Record Speed in King's Cup Air Race

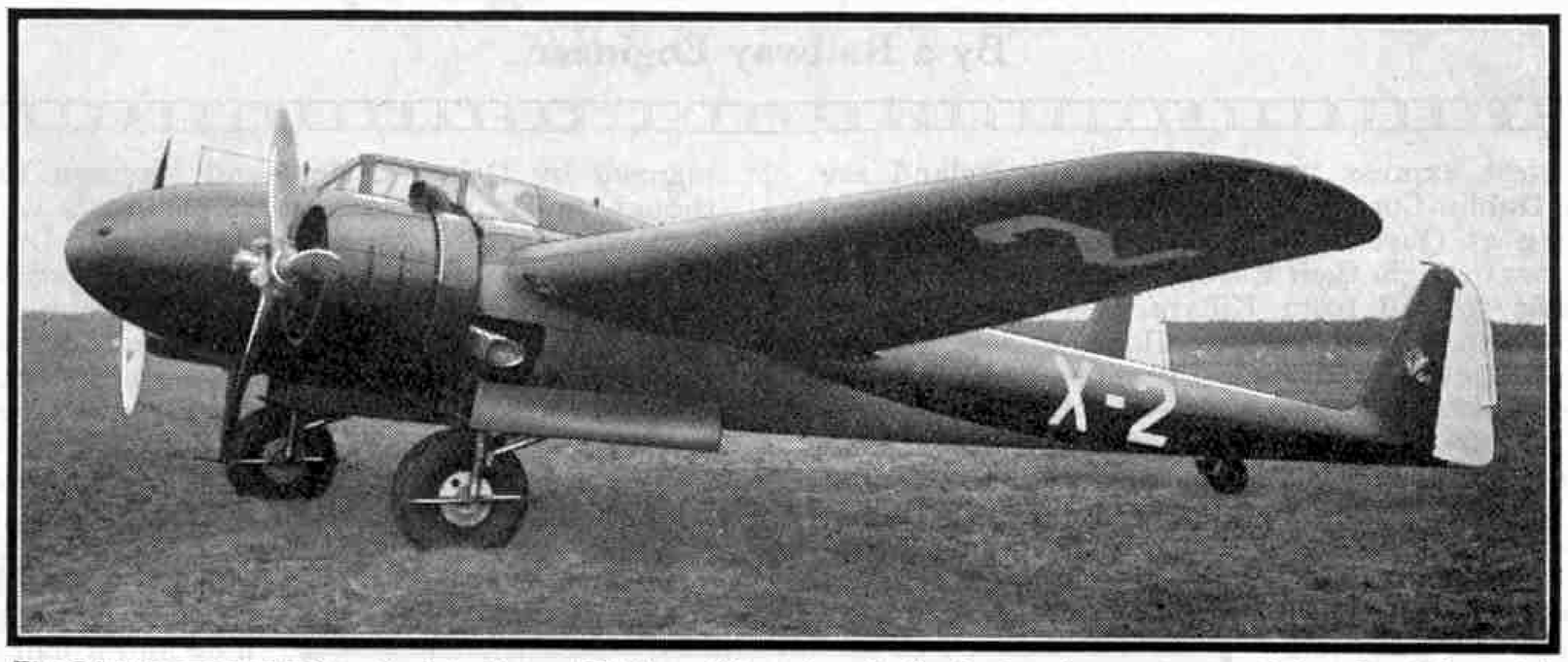
The King's Cup Race on 11th September last was won by Mr. Charles Gardner for the second year in succession. He flew a Percival "Mew Gull" fitted with a D.H. "Gipsy Six" Series II engine. As usual the first day of the Race was devoted to an eliminating contest, in which Gardner covered the 786.6-miles course at an average speed of 213.8 m.p.h. He improved on this speed during the Final the next day, when he attained the high average of 233.7 m.p.h. This is the first time that the Race has been won at a speed of over 200 m.p.h. In the 1936 Race Gardner flew a Percival "Vega Gull."

Second place was won by Brig. Gen. A. C. Lewin, in a Miles "Whitney Straight" fitted with a D.H. "Gipsy Major" engine. He was accompanied by Sq. Ldr. de St. Leger as navigator, and his average speed was 144.5 m.p.h.

A New Fokker Fighter

The military monoplane shown in the upper illustration on this page is the Fokker G.I twin-engined fighter. It has been designed for attacking heavy bombers in the air, but can itself be used as a bomber, or for reconnaissance.

The machine is of unusual design for a large military aeroplane, and in appearance resembles certain American types of twin-engined light aeroplanes, such as the "Crusader" illustrated in the May 1936 *"M.M."* The fuselage is exceptionally short. It terminates just behind the trailing edge of the wing, and the engine nacelles project rearward in the form of two parallel, tapering booms, the sterns of which support the twin-rudder tail unit. The wing is of typical Fokker construction, and is covered with bakelite plywood. The booms have a duralumin framework and a metal stressed skin.



The G.I twin-engined fighter, the latest type of Fokker military aircraft. The fuselage is very short, and the tail unit is carried at the end of long, tubular booms. Photograph reproduced by courtesy of N.V. Nederlandsche Vlietuigenfabriek, Amsterdam.

The fuselage is mounted in the centre section of the wing, between the engine nacelles, and the cabin is provided with seats for the pilot and gunner. There are two fixed machine guns in the nose of the fuselage, and two 23 mm. cannons a little to the rear of the pilot, who has one on each side of him. In the stern of the fuselage is a conical turret, of special Fokker design, in which a 7.9 mm. gun is mounted on gimbals. The gun can be fired irrespective of the position of the turret, which can be rotated through 360 degrees. When the machine is employed as a bomber a load of about 880 lb. of bombs is carried on the underside of the fuselage.

The Fokker G.I was designed to be fitted with Bristol "Aquila" engines, but any radial type of about 880 h.p. can be fitted.

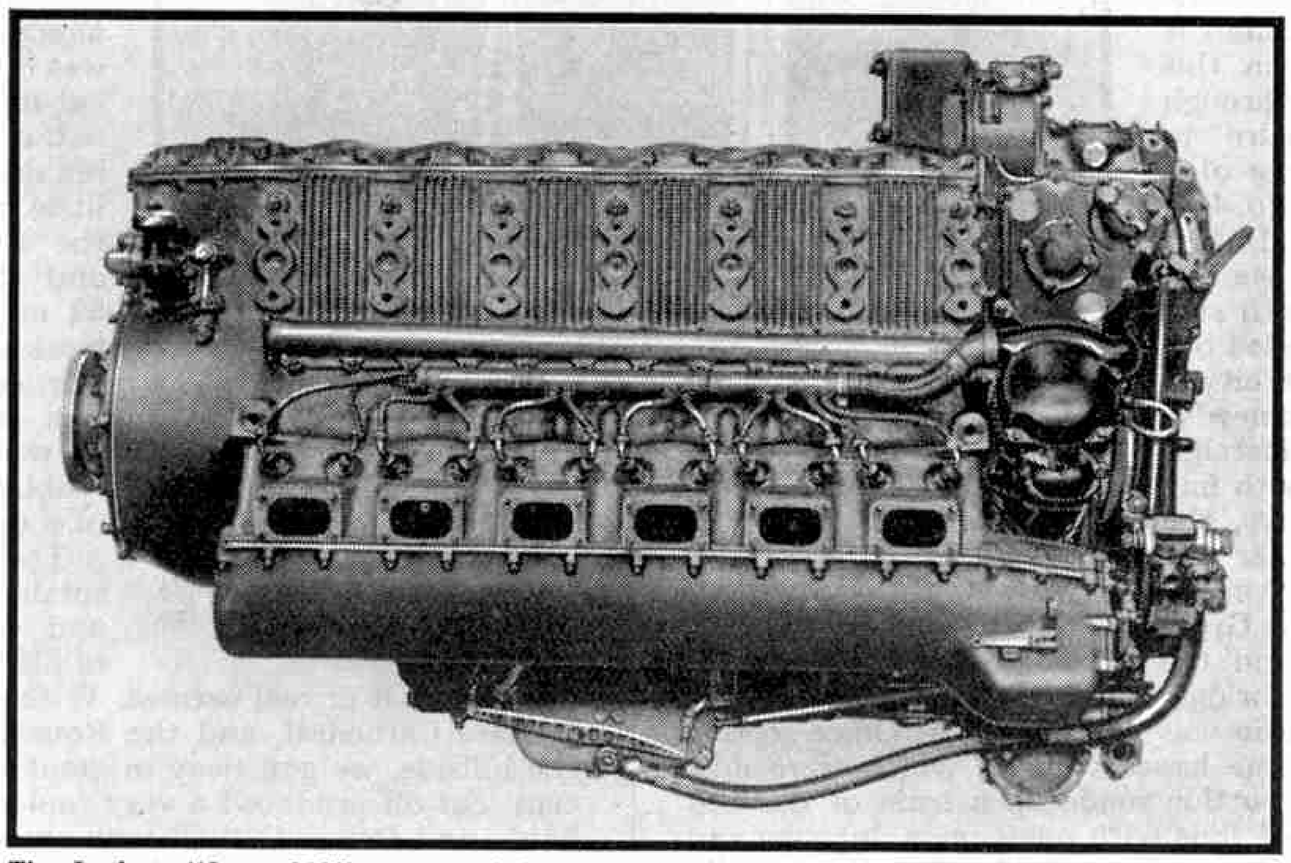
Hawker "Hartebeestes" for South African Air Force

A fleet of 65 Hawker "Hartebeestes" is being built at the South African Air Force Depot at Roberts Heights, Pretoria. The first of the aeroplanes successfully underwent its official trials recently at the Swartkops air station in the presence of the Minister of Defence and senior officers of the S.A.A.F.

The "Hartebeeste" is the well-known Hawker "Demon" two-seater general purpose fighter, with modifications of the engine, armament, and equipment to make it specially suitable for South African requirements. The engines and armament of the 65 aircraft are being obtained from Great Britain, but all the other parts are being made in South Africa.

Junkers "Jumo 210" Aero Engine

The latest Junkers aero engine is the "Jumo 210" shown in the lower photograph on this page. It is a petrol-driven, four-stroke, water-cooled engine of the inverted Vee type, and the 12 cylinders are arranged in two parallel, inclined rows. The front of the "Jumo 210" is so small that the engine fits neatly behind the hub of an ordinary three-bladed adjustable-pitch airscrew. It develops 680 h.p. and weighs 974 lb., equivalent to 1.3 lb. per h.p.



The Junkers "Jumo 210" water-cooled aero engine. It is of the inverted Vee type, with the 12 cylinders arranged in two inclined rows, and develops 680 h.p. Photograph by courtesy of Junkers Flugzeug- und -Motorenwerke A.G., Dessau.

More Qantas Air Pilots for Imperial Airways "School"

The three pilots of Qantas Empire Airways, the company operating the Singapore-Brisbane section of the England-Australia air route, who have been undergoing training at the Imperial Airways "finishing school," have returned home. Four more of the company's pilots have arrived in England. Like the three who preceded them, they have been engaged in piloting the D.H. "Diana" air liners of Qantas Empire Airways, and further training is necessary to qualify them to take over the piloting of the Empire flying boats. The training they will undergo includes a special marine air course at Southampton, where they will master the technique of handling flying boats on the water as well as in the air.

"Cambria's" Record Atlantic Crossing

A new record for the crossing of the Atlantic by air was achieved by the Imperial Airways' flying boat *"Cambria"* on 27th–28th September last, when she flew from Botwood to Foynes in 10 hr. 33 min. at an average speed of 190 m.p.h. The previous best time for the eastward trip was exactly 1 hr. longer, and was set up by the companion aircraft *"Caledonia"* on her eastward flight on 20th–21st August.

The *"Cambria"* also holds the record for the fastest westward flight over the same route. This was accomplished on the 27th August last, when she made the Atlantic crossing from Foynes to Botwood in 14 hr. 24 min.

The latest trip of the *"Cambria"* concluded the series of transatlantic experimental flights carried out during last summer. The flights have been notable for the accuracy of the weather forecasting and the precision of the wireless services, and have proved the practicability of a commercial air service across the North Atlantic.

The England-India Flying Boat Route

A series of survey flights over the Imperial Airways flying boat route to Karachi, India, is being carried out to test the flying boat bases that have been provided in readiness for the introduction of the Empire air mail scheme on this route next year. The section being surveyed extends from Egypt to Karachi. The first flight was carried out by the Empire flying boat *"Ceres,"* and stops were made at the new flying boat bases on Lake Galilee and Lake Habbaniyah, 50 miles from Baghdad, and at Basra, Bahrein, and Sharjah on the Persian Gulf. The second survey flight was carried out by the flying boat *"Centaurus."*

The organisation of the India–Australia section of the Empire flying boat route is in progress. Between Karachi and Calcutta the flying boat alighting points will be a lake at Raj Samand, in Udaipur State, a stretch of water at Gwalior and a river at Allahabad. At Calcutta the aircraft will land on a section of river within the confines of the seaport. Further eastward the organisation will include the splendid harbour that has been provided at Singapore, and flying boat bases in Australia.

The completion of the survey flights over this route will be followed by the establishing of regular flying boat services, at first to Karachi, then to Singapore, and finally to Australia.

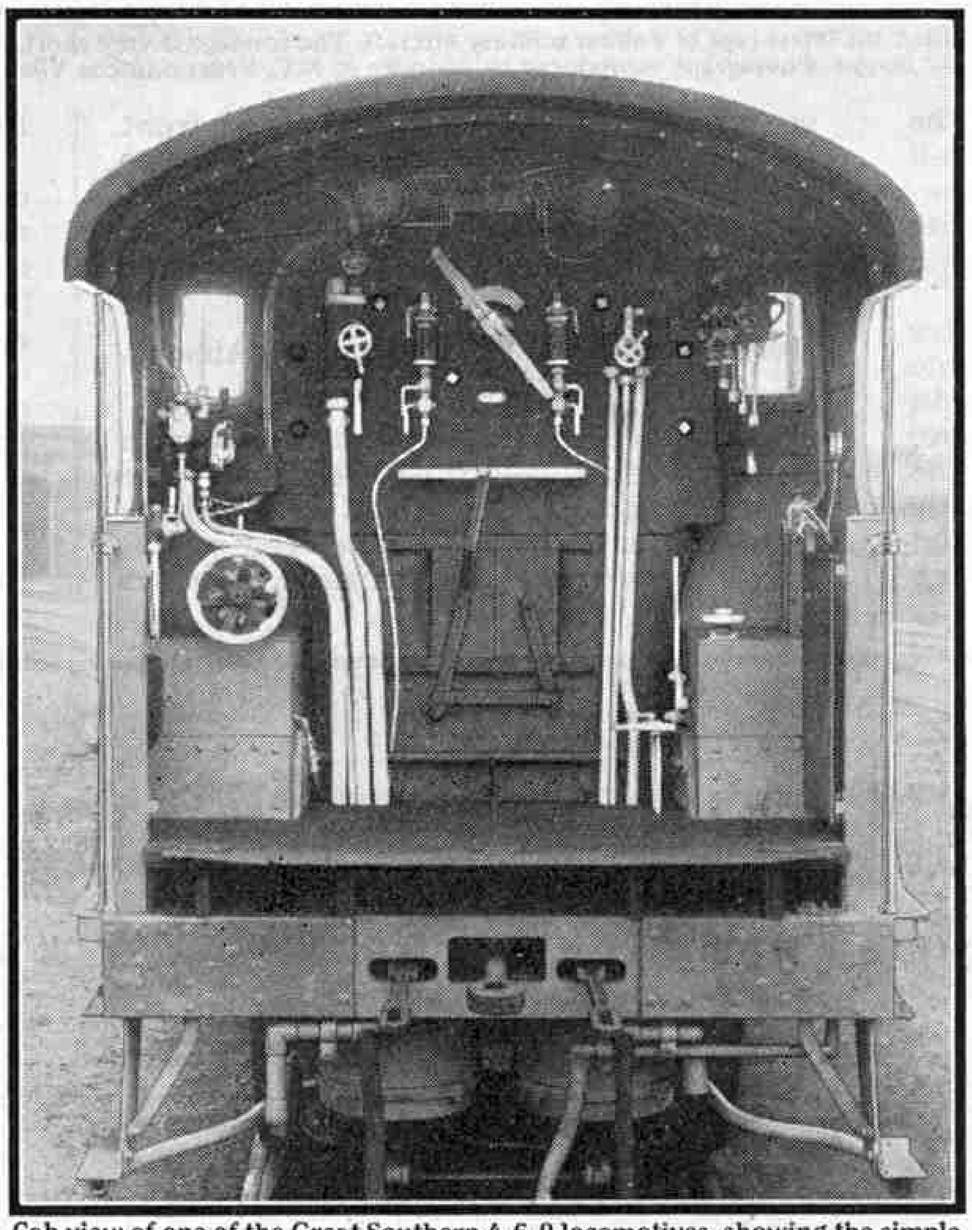
On the Footplate of the "Cork Mail"

Heavy Pulling and High Speed

By a Railway Engineer

SOME of the heaviest express train workings in Ireland are operated over the Dublin-Cork main line of the Great Southern Railways. The calling at Queenstown of Atlantic liners tempts many American visitors to begin their European holidays by way of Ireland; tourist traffic to and from Killarney is always heavy during the summer, and in consequence train loads of 350, 400 and even 450 tons have to be tackled on quite fast timings. The gradients, too, are in places exceptionally severe, and the big 4–6–0 locomotives frequently require pilot assistance. On the other hand there is no main line in the British Isles so absolutely free of speed restrictions. In this respect the 165.3-mile stretch between Dublin and Cork is superior to the most famous racing tracks in Europe, including the main line of the L.M.S. between Euston and Crewe, the London–Doncaster section of the East Coast Route, and the main line of the Northern Railway of France between Paris and the Channel ports.

My footplate journey was made on the hardest train of the day, the 7 a.m. down mail. This express runs in connection with the L.M.S. "*Irish Mail*" which leaves Euston at 8.45 p.m. on the previous evening. On this occasion I crossed from Holyhead, and the arrival in Ireland, and the short run from Dun Laoghaire pier up to Dublin was an interesting prelude to the footplate journey itself. The "*Hibernia*" made the voyage with the usual clockwork-like adherence to schedule, and on landing we found through expresses for Belfast, Cork, and Galway drawn up in the pier station. Traffic from England is ordinarily quite heavy, but on this occasion no less than five through carriages from Dun Laoghaire to Cork were provided. In charge of a handsome 4–4–2 tank engine, No. 457, which belonged to the former Dublin and South Eastern Railway, we ran smartly enough along the south side of Dublin bay, and then threaded our way through the heart of the city—past Westland Row, with its newly-completed electric signalling installation; over the River Liffey, with fine views of the North Wall quays, the Custom House, and many other fine buildings. Then a brief halt at Amiens St. Station to connect with the Great Northern system, and so round the northern fringes and into Kingsbridge, the Great Southern terminus.



Cab view of one of the Great Southern 4-6-0 locomotives, showing the simple and convenient footplate arrangements. Photograph by courtesy of the Great Southern Railways of Ireland.

Here the rest of the mail train was waiting. Post Office sorting vans, restaurant cars, and some lesser vehicles which were now added to the Dun Laoghaire portion made up a train of thirteen coaches, 323 tons tare, and 345 tons with passengers, luggage and mails. Our engine was No. 401, a two-cylinder 4–6–0, specially interesting in having Caprotti valve gear. But although this class are by far the largest express engines in Ireland, they are only moderate-powered machines by present-day standards. The cylinders are 19½ in. dia., by 28 in. stroke; the coupled wheels are 6 ft. 7 in. dia., and the boiler pressure is 175 lb. per sq. in. They are fitted with a Belpaire fire-box that is very wide, and permits only of a narrow rectangular look-out in the cab front, despite the extra width of loading gauge due to the 5 ft. 3 in. gauge.

The most noticeable feature of a well-arranged cab is the reversing wheel for the Caprotti valve gear. This is mounted vertically, after the style of a "Schools" class 4–4–0 of the English Southern Railway, but a very small rotational movement is enough to produce quite a big variation in cut-off. In one complete turn of the wheel the gear is shifted from full forward to the full reverse position. The regulator is of the two-port type, with a double handle to make adjustment easier for the driver. On my trip No. 401 was manned by Driver O'Neill and Fireman Brosnan of Cork shed, though in the course of a single day's work these engines are regularly handled by crews from both Dublin and Cork sheds.

With this substantial load a pilot was provided to give some help up the steep initial bank to Clondalkin; this was No. 328, one of the big 4–4–0s. Right at the platform end climbing begins at 1 in 117. Driver O'Neill started off on 60 per cent. cut-off, opening immediately on to the main regulator, and then, as we passed Islandbridge Junction, where the gradient stiffens to 1 in 84, cut-off was reduced to 50 per cent. and the regulator pushed hard over to the "full." By this time the two engines were fairly rousing the echoes, but although the pilot was doing her fair share of the work the speed had only reached 23 m.p.h. when we passed the Great Southern locomotive works at Inchicore, a mile and a half out.

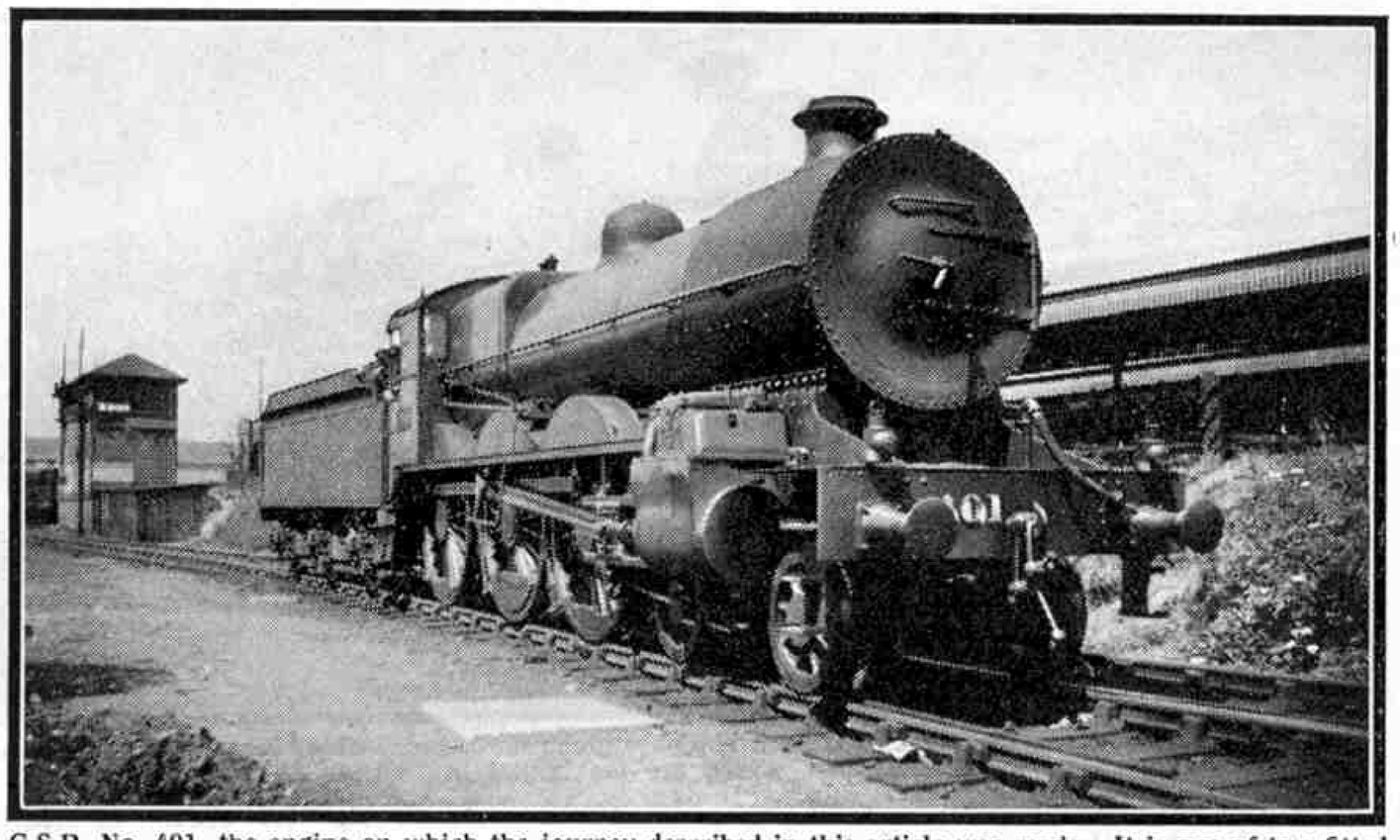
Beyond this point the grade eases to 1 in 138, but No. 401 was still kept pounding away on 50 per cent. cut-off, and we came over the top of the bank at 38 m.p.h. This initial 4.4 miles, out to Clondalkin, had taken just 10 minutes. From here onward we could easily have dispensed with the pilot, but to stop and detach the 4–4–0 at this point would have nullified the advantage gained up the bank, and so she went through to our first stop, at Kildare. Throughout this length the line is rising, very gradually for most of the way, and through an intensely green countryside, the kind of landscape that gained for Ireland its subtitle of The Emerald Isle, we bowled along under very easy steam. No. 401 was now being worked on 25 per cent. cut-off with the first regulator only half open. A slack for permanent way repairs near Straffin troubled us but little. Speed then rose to 66 m.p.h. on the faint rise towards Newbridge, and then, without falling below 52 m.p.h., we mounted the 2¼ mile bank at 1 in 172 that leads over the Curragh, that rolling downland that was once the Aldershot of Ireland. So we reached Kildare, 30 miles from Dublin, in 41¼ minutes, three-quarters of a minute inside booked time.

The pilot was now detached, two small vans were taken off the rear, and with this slightly reduced load of 320 tons No. 401 and her crew buckled to it in real earnest. With a pleasing backward glimpse of Kildare Cathedral, and the Round Tower of St. Bridget high on the hillside, we got away in great style. Full regulator and 50 per cent. cut-off produced a very rapid acceleration down the 1 in 180 bank, and Driver O'Neill soon changed over to the first valve, full open, and 30 per cent. cut-off. Four miles from the start we were doing 68 m.p.h. and then over the slight ups and downs past Monasterevan and Portarlington we kept up a steady 57 to 65 m.p.h. One could now appreciate not only the fine riding qualities of the engine but the superb alignment of the track. On the footplate it goes without saying that there was plenty of racket, but the beautifully steady way in which the engine negotiated curves and junctions at high speed was most impressive. The 20.9 miles from Kildare to Maryborough were thus reeled off in 23½ minutes, 2½ minutes inside schedule.

Harder work is required on the next section. With another van detached from the rear, and load thus reduced to 310 tons, O'Neill started up the 1 in 230 rise out of Maryborough on 60 per cent. cut-off, opening well out on to the main regulator. The engine responded with a roaring exhaust and a splendid acceleration, passing Clonkeen, just two miles out, at slightly over 40 m.p.h. She was then let go full tilt downhill on the main regulator and we

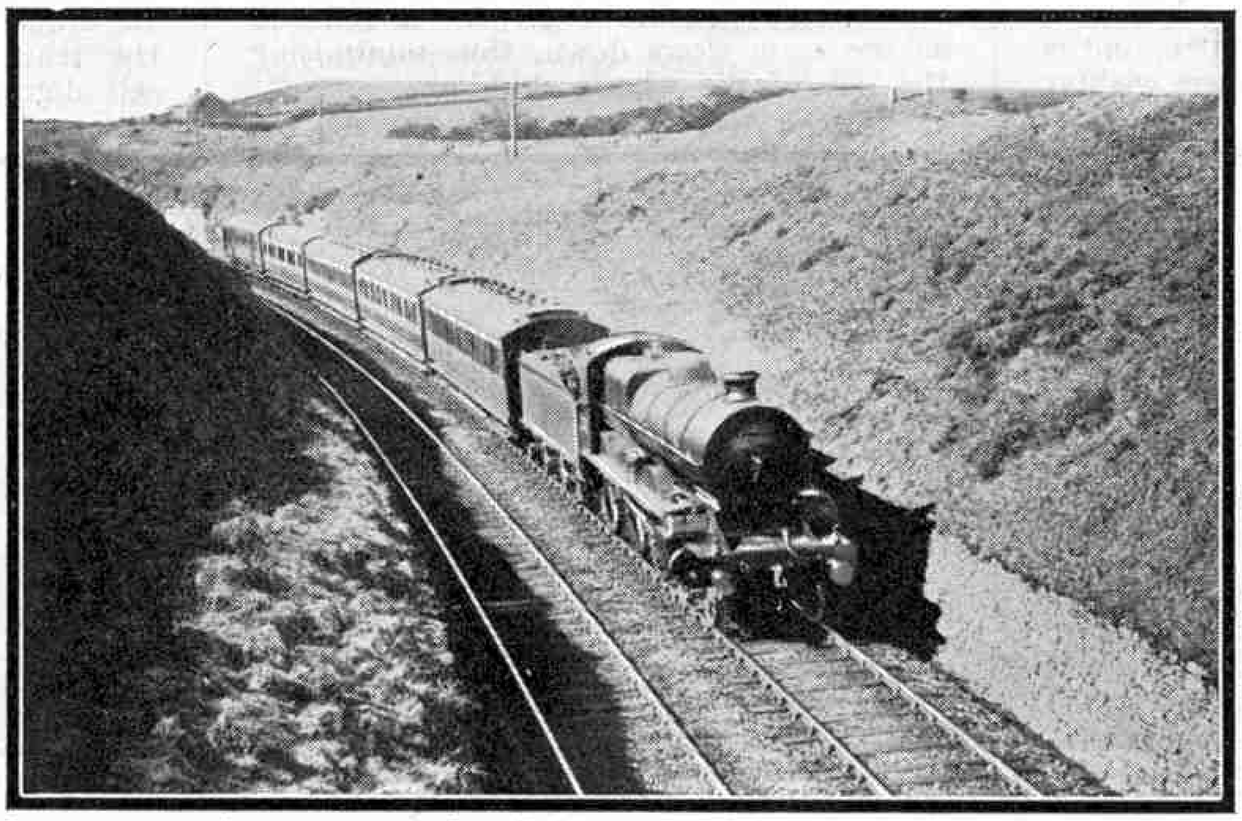
raced through Mountrath at 67 m.p.h. I was very interested in the method of firing. Although the fire-box is wide at the top it tapers down to the usual fairly narrow grate that one finds on 4–6–0 engines, and yet each shovelful of coal was being placed with the same meticulous care that one notes on the L.N.E.R. wide fire-box types. At each firing the driver assisted his mate by closing the fire doors between each shovelful; normally the two sliding doors were left just ajar so that the state of the fire could be seen.

By this time we were past Cuddagh, going 64 m.p.h., and just beginning the three-mile climb at 1 in 128 that leads to Ballybrophy. O'Neill opened right out to full regulator, increasing cut-off at the same time to 35 per cent., and we got up the bank without speed falling below 41 m.p.h.—an excellent piece of work. A minute later we were running into Ballybrophy, having covered the 15.7 miles from Maryborough in 20½ minutes; here again booked time had been improved upon by 2½ minutes. On the next stage, to Thurles, the line undulates at more or less easy gradients, the general tendency being dead level; but at the same time there is a very marked change in the landscape. The vivid green meadowlands of County Kildare gradually give place, as the line crosses Queen's County, to wider rougher pastures; isolated ranges of hills rise above the level of the plains, and ahead there is a hint of loftier wilder mountains.



G.S.R. No. 401, the engine on which the journey described in this article was made. It is one of two fitted with Caprotti poppet valves, and the valve boxes are prominent above the cylinders.

On getting away from Ballybrophy, after a short spell on the main regulator, the driver changed over to what appeared to be his favourite method of working, 30 per cent. cut-off and the first regulator full open. No. 401 was soon galloping again; we entered County Tipperary at exactly 70 m.p.h., took the slight rise through Templemore at 67½, and were going splendidly at 72 m.p.h. on the very gradual decline beyond when we had to slow up for permanent way repairs. In spite of this we covered the 20 miles from Ballybrophy to Thurles in 23 minutes, a minute inside schedule; unchecked we should have done it a minute quicker still. At Thurles, as at every other stopping station, two men were waiting to board the tender and help the fireman to get coal forward. The fuel was rather small—in parts little better than slack—and it obstinately refused to shake down as the tender was emptied. In the fire-box, too, Brosnan several times had to ram the coal forward from an accumulation under the door. Nevertheless the engine steamed splendidly, and the gauge needle was stock still at 175 lb. per sq. in. for most of the run. As for the coal and its dustiness—well, I shall never forget the sight of my face when I came to clean up at Cork; I could not have been grimier if I had tried to bury my head in the tender! My dungarees fairly glistened with coal dust.



Locomotive No. 401 on an express from Dublin approaching Cork. The well-kept permanent way is characteristic of the Great Southern Railways. Photograph by Mr. R. Murphy, Cork.

From Thurles there is a splendid start down falling grades to the valley of the River Suir, and in six miles we were doing 70½ m.p.h. The 1 in 230 rise to Goulds Cross was cleared at a minimum of 61 m.p.h., and then we continued at a steady average of a mile-a-minute across the level plain of Tipperary, amid a vast green chequerwork of hedgerows and square fields. So we came to Limerick Junction, the strangest layout imaginable.

Much has been written about the curiosities of working at this station, and in the "*M.M.*" for November 1935 the procedure was described in full detail. But it has always seemed to me that Limerick Junction is the safety valve of the whole Irish railway system. Throughout their country Irishmen planned and constructed a thoroughly logical and orderly transportation scheme, and although the train running was not as fast on some lines as it might be, it certainly was straightforward. But when it came to connecting up the old Waterford and Limerick Railway with the main line from Dublin to Cork, national characteristics could be restrained no longer, and in one glorious "fling" they packed more railway Irish-isms into one square mile of countryside than are to be found in all the rest of Erin put together. Without Limerick Junction the Great Southern would not be an Irish railway!

But in spite of all the complications, the conflicting cross-over movements, reversals of direction, and the fact that modern express trains have far outgrown that one long platform, traffic is operated very smoothly. Procedure has been reduced to a fine art. In spite of the varying lengths of train, drivers seem to know the exact spots at which to stop on the main line; while points operation and the backing movements are carried out very quickly. On this trip of mine Driver O'Neill ran through to a very smart stop at the south end, and a minute-and-a-half later we had backed right across the up main line and were at rest in the station. The 20½-mile run from Thurles to our stop on the main line before backing in took just 24 minutes, another very smart piece of work.

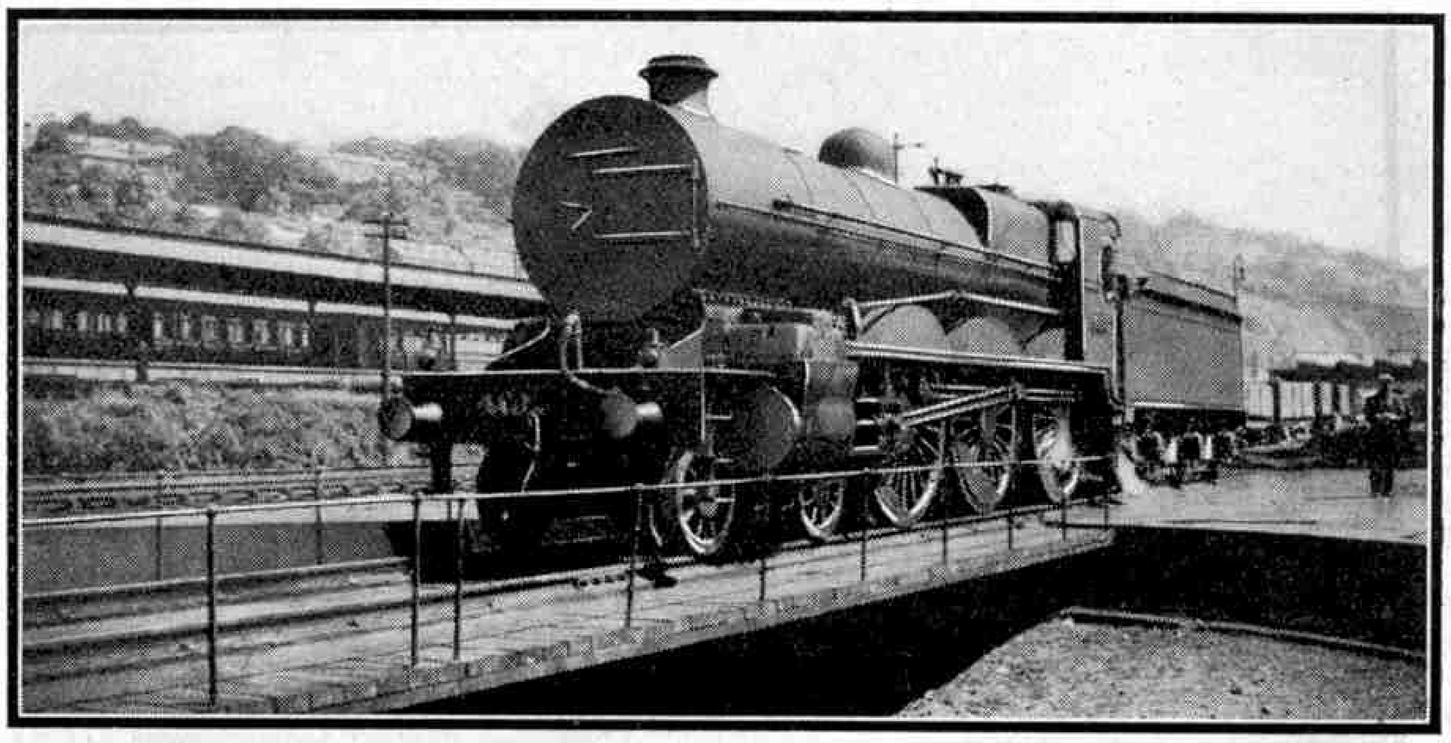
After a halt of five minutes we got away again on the longest non-stop run of the whole journey, the 37.6-mile stretch to Mallow. On each successive stage the locomotive work seemed to be getting finer and finer, and now with full regulator and 60 per cent. cut-off No. 401 boomed her way up the 1 in 156 ascent out of Limerick Junction. Eastward lay the Galtee Mountains, a noble range of frowning crags dominated by the shapely cone of Galteemore. Once up the first bank No. 401 was quickly into her normal stride and we swung through Emly at 65 m.p.h., but just along here a very slight "spot of bother" developed on the footplate. The live steam injector was giving some slight trouble, and this, combined with a particularly dusty patch of coal, caused the boiler pressure to fall.

Driver O'Neill's handling of the engine during this awkward stage was very skilful. Down the racing descent past Kilmallock he shut off steam altogether, but impetus and the astonishingly free running so characteristic of Caprotti valve gear engines enabled us to keep up a steady 66 m.p.h. This gave a useful respite to the boiler. The moment we reached the foot of the bank O'Neill opened well out on to the main regulator, and this with 30 per cent. cut-off sharpened the blast, drew the fire, and took us up Charleville bank at the brilliant minimum speed of 51½ m.p.h. The pressure gauge needle was still inclined to droop, but the engine was fairly "let fly" on the moderate grades beyond, and at Buttevant we touched 75 m.p.h.

We went splendidly up the three-mile ascent to the oddly-named summit of Two Pot House, mounting this grade of 1 in 142-230 at a lowest speed of 51½ m.p.h., and once speed was up to 60 again on the descent to Mallow, Driver O'Neill shut off steam and let the engine coast. In spite of these hindrances the 37.6 miles from Limerick Junction were covered in 44½ minutes, just on the right side of

schedule time, while in response to this fine enginemanship the boiler pressure steadily rallied until it reached blowing-off point while we stood in Mallow station.

We needed every ounce of steam now, for the last stage into Cork is very heavily graded. Mallow lies in the Blackwater valley, at the junction of the Killarney branch, and the main line climbs southward between the Nagles and Boggeragh Mountains. Here the railway rises at 1 in 125–140 for nearly seven miles. On getting away there is a glorious view, eastward from the viaduct, of the Knockmealdown Mountains, while in the opposite direction may be glimpsed some of the heights of Killarney. Now the run was working up to a really glorious climax. On full regulator and 60 per cent. cut-off No. 401 literally roared up among the hills; speed rose to 34 m.p.h. on the 1 in 125 pitch, and then as we came on to the slightly easier length at 1 in 140 the engine was going so well that O'Neill linked up to 45 per cent. We steadily accelerated. Nearing Mourne Abbey we were doing 38 m.p.h.—great work this—when, alas, signals were against us, for the first time in the whole run. The driver kept steam on until we were past the distant signal, but it was of no avail, and we slowed down to walking pace through Mourne Abbey station. Then, just as a stop seemed inevitable, the starter was pulled off and in a moment O'Neill had given No. 401 "the lot."



G.S.R. No. 401 running on to the turntable at Cork. This photograph shows very well the characteristic appearance of these engines, which are the largest in Ireland.

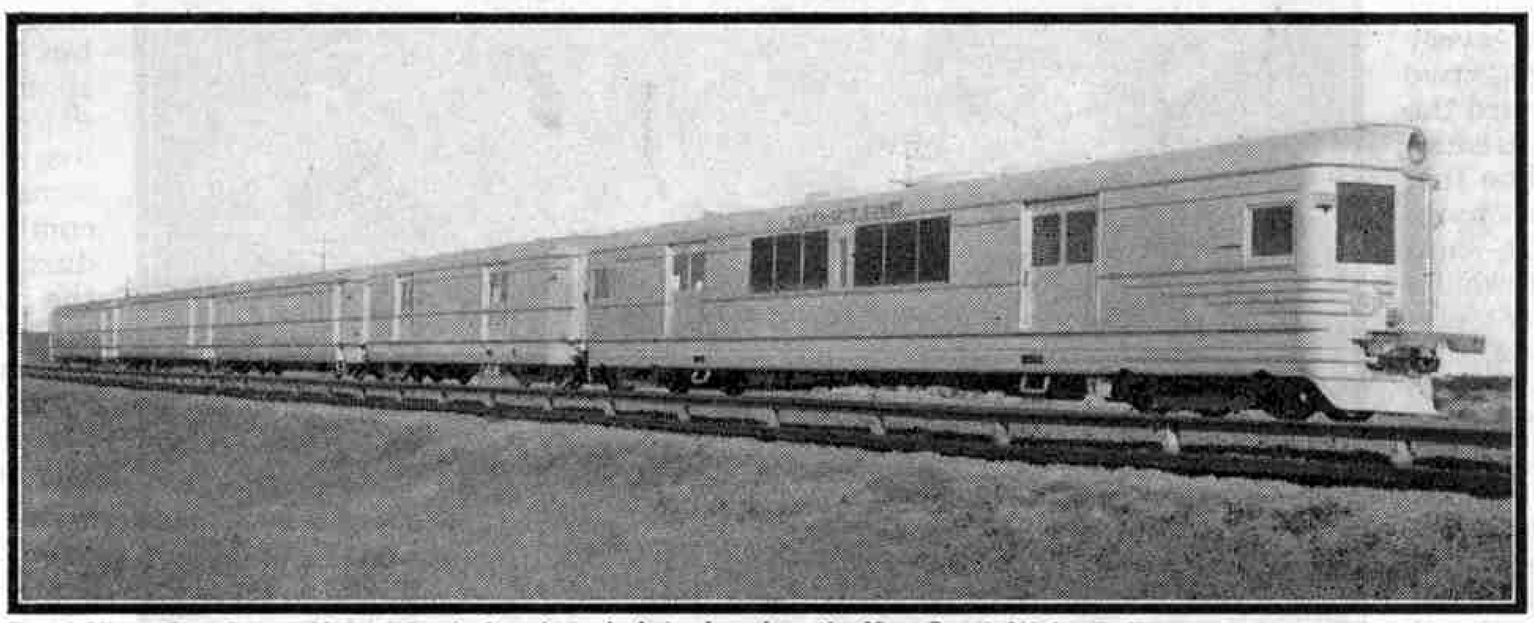
And now the engine was put to it with redoubled vigour. On full regulator and no less than 70 per cent. cut-off we verily thundered away, and speed was up to 30 m.p.h. ere we were out of sight of Mourne Abbey, a fragmentary ruin standing sentinel on the hillside. As we roared our way up cut-off was reduced little by little, but even when we topped the summit we were still going on 50 per cent.; speed had then risen to 36 m.p.h. There was no restraining the engine downhill now, and on 30 per cent. cut-off and the first regulator we went pellmell for Cork. Rathduff was passed at 59 m.p.h. and speed leaped up through the seventies; eighty, and yet faster, till we tore through Blarney at 83 m.p.h. We continued at a terrific pace right to the top of the precipitous incline that leads down into Cork, and then as we began the descent O'Neill checked the speed to about 50 m.p.h. We coasted smoothly down the 1 in 60 gradient, braking carefully all the way, until we entered Kilbarry tunnel at about 30 m.p.h. A couple of minutes later we emerged rounding the curve into Cork. In spite of that nasty check at Mourne Abbey we had almost kept time, covering the 20.8 miles from Mallow in 29½ minutes.

At most of the intermediate stations we stayed slightly overtime on account of heavy traffic, but these arrears were more than recovered by the splendid work that Driver O'Neill got out of No. 401. Indeed he gained in all 11½ minutes on schedule time and made the complete run from Dublin in 3 hours 52 minutes, instead of the 3 hours 55 minutes booked. A very spirited and entertaining performance.

The *"Silver City Comet"*

The *"Silver City Comet"* is the first of four high-speed semi-streamline Diesel trains to be placed in regular service between Parkes and Broken Hill, on the New South Wales Railways of Australia. Broken Hill is a famous metalliferous mining centre, and in the days of steam travel passengers wishing to reach it from Sydney found the journey long and tiresome. They are now able to leave Sydney at night by a sleeping-car train, and change over to the *"Silver City Comet"* at Parkes the following morning, arriving at Broken Hill, 427 miles away, the same evening.

The power car of the train is divided into three main compartments, with a driver's cabin at each end. The central compartment is the main engineroom, on each side of which is an auxiliary engineroom and a baggage compartment. Motive power is supplied by two 8-cylinder two-cycle Diesel engines each developing 330 h.p. Two 34-h.p. four-cycle Diesel engines are installed in the auxiliary engine compartment. Each of these is coupled to a generator for the purpose of supplying power for train lighting, air conditioning of the passenger cars, heating and cooling requirements of the buffet and compressed air for the braking system. The air brake is the Westinghouse automatic straight air system and it incorporates a "dead-man" control as well as a "retardation" controller. At high speeds the maximum braking force is available and by a pendulum action the braking force is reduced as the train slows down, thus minimising the risk of the wheels skidding.



The "Silver City Comet," the Diesel-electric train introduced on the New South Wales Railways. This photograph and the information contained in the article are reproduced by courtesy of the Commissioner for Railways, New South Wales.

A powerful headlight assists the driver to see the road ahead during periods of darkness and a novel feature, similar to that used on some American trains, is a vertical beam of light that is provided to enable drivers of road vehicles about to use the level crossings to ascertain the position of an oncoming train.

The *"Silver City Comet"* is a well-appointed train and provides something new in railway travel in Australia. The cars are of the saloon type, with large windows similar to those now fitted to the vehicles of modern British expresses. The seats are reversible, and so enable passengers to face whichever direction they prefer. Each car has a centre corridor and an entrance vestibule at each end. In order to ensure the steady riding of the train the axles of each car run in self-aligning roller-bearing axle-boxes. Rubber pads are used exclusively throughout the bogie springing system, so that the wheels are entirely insulated from the body of the car. This arrangement reduces the noise and vibration to a minimum.

Light meals are served throughout the train and an electrically-equipped buffet is part of the equipment. This buffet is the first of its kind to be established in Australia. It is fitted with a refrigerator and other appliances necessary for the preparation of meals during the journey. All exposed metal work in the buffet is of stainless steel or polished aluminium, or is chromium-plated.

The passenger cars are fitted with air-conditioning apparatus of the most modern type. Fresh air is drawn in through a louvred recess in the roof, and after being cleaned it is heated or cooled according to requirements. Insulation is provided in the floors, sides and ceilings, and double windows are fitted.

Searching for Oil in Great Britain

How a Rotary Drill Works

ARE there any underground reservoirs of oil in Great Britain? This is a question that has long engaged the attention of experts. During the Great War, when difficulties were encountered in obtaining the necessary supplies from abroad, wells were drilled in Derbyshire and other parts of the country, but with little success; and except for the comparatively small yield from the shale beds of Scotland, we depend entirely on imported supplies. During the last two years a thorough search has been undertaken to ascertain definitely whether oil exists or not. The Anglo-American Oil Company Limited have been actively engaged in this search, for which they hold a prospecting license covering an area of 490 sq. miles, and have discovered several promising rock formations. An unsuccessful effort has recently been made to find oil at Hellingley, Sussex, and drilling has now begun for a well at Dalkeith, near Edinburgh. The site of this is near a well drilled in 1919, from which a few barrels of crude oil were obtained.

Many people think that oil occurs in underground lakes or rivers, but really it is found in porous rocks such as sandstone and limestone. It was probably formed thousands of years ago from vegetation, marine plants or organisms, which decomposed under the influence of heat and pressure, producing the liquid known to-day as crude oil. This is lighter than water, and immediately after its formation floated upon any water that happened to be present. Thus it gradually worked its way upward, and where all the rocks above it were porous it eventually reached the surface of the earth and evaporated.

In some places, however, the progress of the oil was barred by non-porous formations, such as clay, which had been distorted by earth movements into shapes resembling underground hills. These hills are known as anticlines, and the oil trapped in them gradually accumulated, forming the reservoirs that drillers strive to reach to-day. The oil is under great pressure, from gas dissolved in it and from water beneath, so that care must be exercised in completing the wells. The holes during drilling are always full of heavy mud, which exerts a pressure greater than the oil and gas. As this mud is slowly baled out, the oil is allowed to come to the surface, and is conducted to tanks through heavy steel pipes.

It is a difficult task to find these hidden stores of wealth. The surface rocks of the area to be prospected are first examined, for their slope is a clue to the hidden formations in the depths of the Earth beneath them. When an underground hill of the right kind has been found, the manner in which it has been formed and the nature of the strata below the surface must be taken into account. Thus if there are layers of volcanic rock there will be no oil, for such rock is too solid to allow the oil to soak through it. On the other hand, porous sandstones, limestones and sands form suitable layers for the movement and collection of oil.

When the geologist has found conditions that seem to indicate suitable underground formations, the work is turned over to the engineer, who erects drilling machinery capable of penetrating if necessary 10,000 ft. or even more into the Earth, in order to reach oil-bearing rock. Drilling is an expensive process, and if no oil is found, the cost of the operations is a complete loss. Even if oil is present the bores may just miss the porous rock reservoir, and the sinking of one or two unproductive wells could easily ruin a company that had not a large financial backing.

Rotary drilling, in which a bit is rotated at the end of a hollow pipe, is most commonly employed, and the necessary gear is suspended inside a derrick that may be 130 ft. high. The drill pipes are very heavy steel tubes from 4 in. to 6 in. in outside diameter. They are made in 30 ft. lengths that can be screwed together, and the bit is screwed into the bottom of the pipe. The bit is lowered to the surface of the ground and the whole assembly is given a rotary motion that causes it to dig its way into the Earth under its great weight. Until recently steam engines were used for operating the machinery that rotates the drill, but Diesel engines are now often employed for the purpose.

After the drill has penetrated 30 ft. another length of drill pipe is added, and so on with fresh sections as the bit forces its way through the ground. A mixture of clay and water known as rotary mud is pumped down through the interior of the drill pipe and is ejected with terrific force through two holes in the bit near the cutting edge. The rotary mud washes the cuttings and pieces of rock to the surface, where they settle in pits, and the mud is re-circulated. This circulation also tends to have a cementing action on the walls of the hole, and prevents it from caving in.

The opening of a trial oil well recently bored at Hellingley, Sussex, showing the type of rotary drill used in the operations. Photograph by courtesy of the Anglo-American Oil Company Limited.

The fishtail bit, the name of which indicates its shape, is employed when drilling through relatively soft material, such as clay or sand, and special rock bits are used for boring through harder rocks, such as gypsum, limestone and sandstone. The latter bits are equipped with cones having very sharp teeth, and with the weight of the drill pipe above them they grind their way through the rocks.

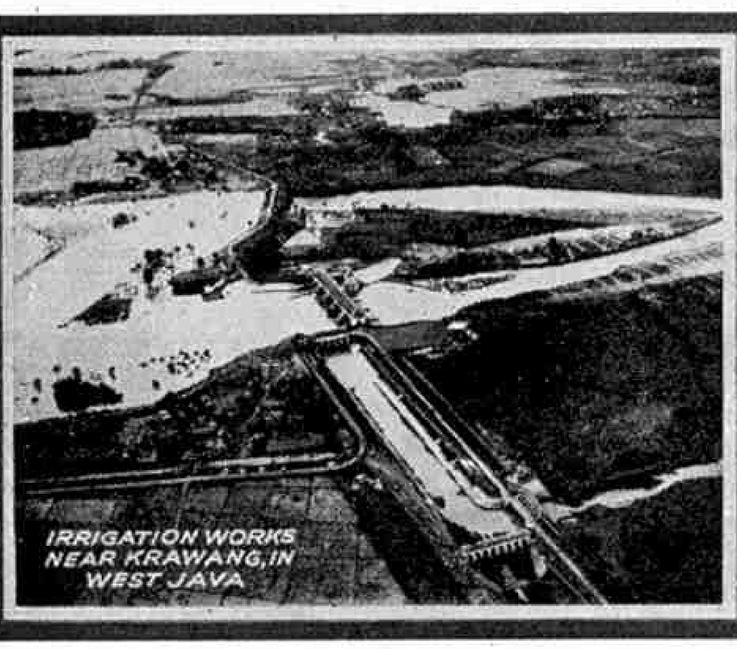
It is often necessary to take samples of the strata through which the drill is penetrating, and for this purpose a core bit is used. This cuts a hole in the shape of a ring, leaving the central portion untouched. As the cores are taken they are drawn to the surface in pieces 15 ft. to 20 ft. long, and are inspected by a geologist, who is able to identify the characteristics of the rock.

Near the surface the diameter of the hole is usually from 15 in. to 20 in. When a few hundred feet have been drilled steel casing is inserted, and cement is pumped up between the outside of the casing and the walls of the hole in order to prevent the latter from crumbling, and also to keep out surface water. The hole is then drilled deeper with smaller bits, and more casing of a smaller size is inserted. This continues until the oil-bearing layer is encountered.

Once drilling operations are started they proceed day and night without break, the rig being operated by three crews of men, who work eight hours each. It would be impossible to shut down operations during the night-time, for the portion of the well that had not been encased might collapse, and sand and clay settling out from the rotary mud would choke the bottom of the hole.

During the boring it is continually necessary to withdraw the drill pipe from the hole in order to change the bit. A good team of men can do this at a remarkable speed, withdrawing over a mile of pipe in from three to four hours. The pipe is hoisted up until a length consisting of three sections extends above the surface. This length is unscrewed in one piece and detached, and the process is repeated until all the pipe has been removed.

When the well is ready for production, tubing 2 in. to 4 in. in diameter is often inserted, and through it the oil and gas come to the surface. The well may be a "gusher," with the oil flowing to the surface under its own pressure. When the natural p ressure is exhausted it becomes necessary to pump the oil to th e surface.



ENGINEERING NEWS

A Large Surface Condenser with 63½ miles of Tubes

In modern electric power stations the generators are driven by steam turbines. From the turbines the steam passes into a condenser that performs two important duties. It turns into water the steam that has done its work in the turbine, so that it can be used again to feed the boilers, and in conjunction with an air ejector it maintains a high vacuum on the exhaust side of the turbine, thus ensuring a steady flow of steam.

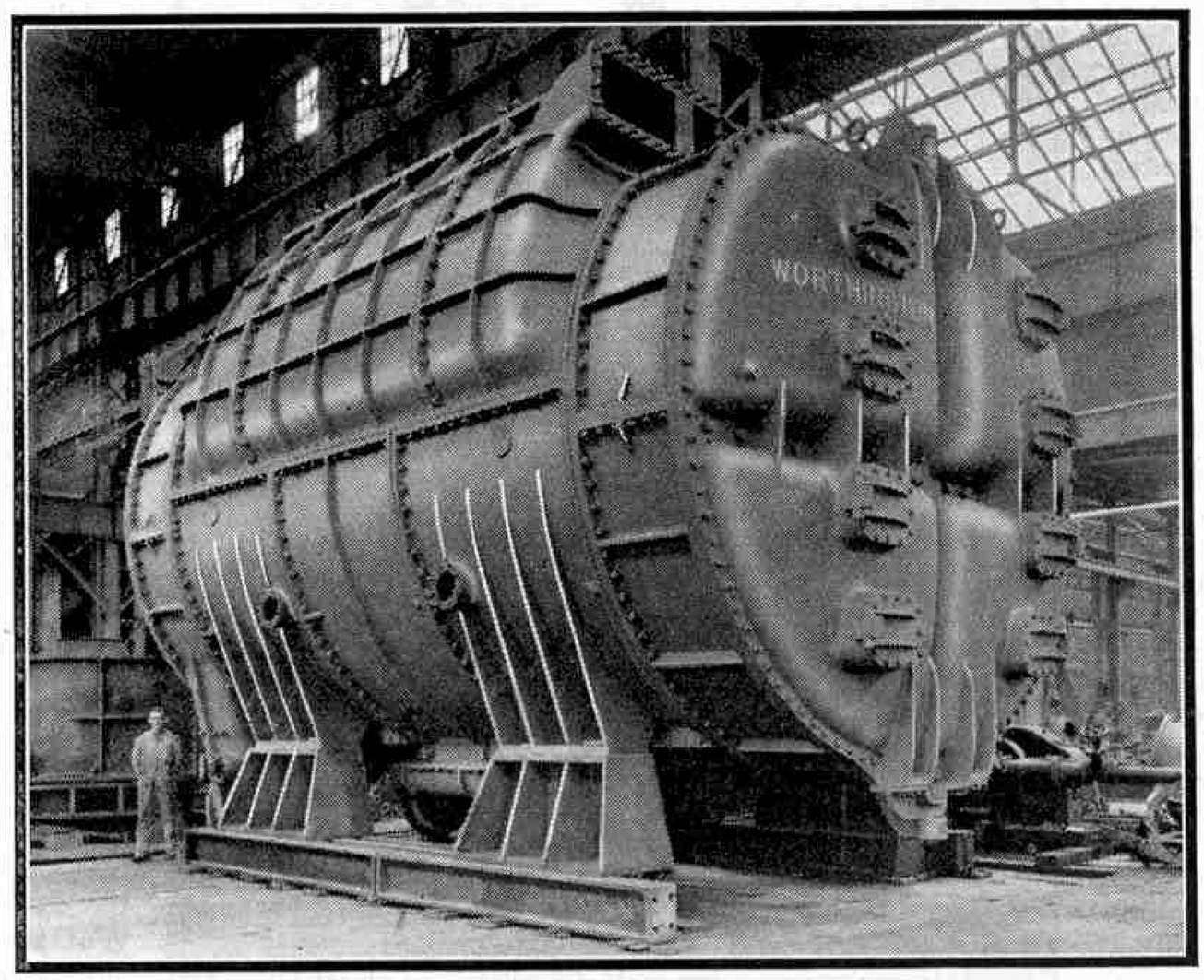
There are many types of condensers, but those used for turbines are nearly always of the surface type. In these the exhaust steam is condensed by coming into contact with a cold surface, in the same way that steam from a kettle can be condensed by discharging it on to a cold plate. The cold surface is provided by brass tubes, through which cold water is pumped.

The illustration on this page shows the largest condenser so far made in this country. It was built by Worthington-Simpson Ltd., Newark-on-Trent, and contains nearly 18,000 brass tubes, each of ¾ in. inside diameter, which provide a cooling surface of 65,000 sq. ft. The total length of tubes is 63½ miles. Two large pumps discharge 3,000,000 gallons of water through the tubes every hour. The pressure in the condenser is about ½ lb. per sq. in. absolute, that is, about 14.2 lb. per sq. in. below the average of the atmosphere.

The exhaust steam enters through a hole 16 ft. by 12 ft. in the top of the condenser. The water formed falls into a vessel underneath, and from there is pumped through heating equipment to the boilers. Two openings are provided on the side of the casing for connections to an ejector, which withdraws the air from the condenser and discharges it to the atmosphere.

The end covers of the condenser are hinged, so that access can readily be gained to the tubes when they require cleaning or repairs. Although the covers weigh 7 tons each, they can be swung on their hinges by the pull of one finger.

The weight of the condenser in working order is over 250 tons, and it is carried on springs so that it can expand and contract freely under changes of temperature.



A giant condenser for a turbine power plant. It has a cooling surface of 65,000 sq. ft. and is the largest made in this country. Photograph by courtesy of Worthington-Simpson Ltd., Newark-on-Trent.

Millwall Dock Scheme

The Port of London Authority has decided to carry out a number of improvements at the Millwall Dock. The East Quay, Inner Millwall Dock, which is 1,310 ft. in length, is to be widened, and the dock itself will be deepened by dredging to give a uniform depth of water of 29 ft. The No. 4 dolphin, at which vessels from West African ports have hitherto been discharged, will be removed. The work will take about 18 months to complete and is estimated to cost nearly £110,000.

Supplying London's Gas

During the past five years the Gas, Light and Coke Company, London, have laid over 200 miles of gas mains annually. Recently a length of gas main laid down at Woodford brought the total mileage of the company's mains up to 6,000, a figure greater than that of any other similar company in the world. About 1,800 men have been employed continually in laying the pipes and in repair work.

An area of 540 square miles is served by the Company, the number of consumers of gas being about 1,500,000. The distributing system now consists of some 2,650,000 pipes, with diameters varying from 2 in. to 4 ft. and having a total weight of 560,000 tons.

An All-Electric Open-Air Swimming Pool

A giant open-air swimming pool, in the successful operation of which electricity plays an important part, has been constructed at Croydon. The pool is 200 ft. long and 70 ft. wide, and is surrounded by flower beds, grass lawns and shingle sunbathing beaches. Rectangular bays, 60 ft. wide, have been constructed in each of the longer sides, giving an overall width at the centre of 100 ft. The depth varies from 3 ft. 6 in. at each end to 6 ft. 6 in. at the centre, with a 15 ft. deep diving pool in one of the bays.

The water for the pool is warmed by means of an electrode boiler, and is sterilized by ozone, which is produced electrically. The installation is considered to be the first in which electricity is used for both purposes in such a manner. The electrode boiler was constructed by Sulzer Bros. (London) Ltd., and has a capacity of 750 kW. The hot water from it is circulated through a heat exchanger by means of a pump coupled directly to a 5-h.p. motor, and its temperature is maintained by automatic thermostat control.

The rapid filtration plant employed is capable of treating the 650,000 gals. of water contained in the pool once in six hours. After passing through the filter plant the water is returned to the pool through the heat exchanger, where it is re-warmed by the heat produced by the boiler.

The ozone for sterilizing the water is produced in special generators in which air is subjected to the action of an electric discharge. The ozone is fed into the filtered water delivery main, and also is blown directly into the pool through small tubes, fitted in the floor.

At night the pool is illuminated by electric lights contained in 36 port holes built into the sides below the water level. Each port is covered with ½ in. plate glass, and contains a 1,000-W lamp backed by a stainless steel reflector.

San Gabriel Dam

The San Gabriel No. 1 Dam near Los Angeles, in the United States of America, is now completed. It is a rock-fill structure 355 ft. in height above bedrock, and is the highest dam of its type yet built.

An Interesting 12-wheel Trailer

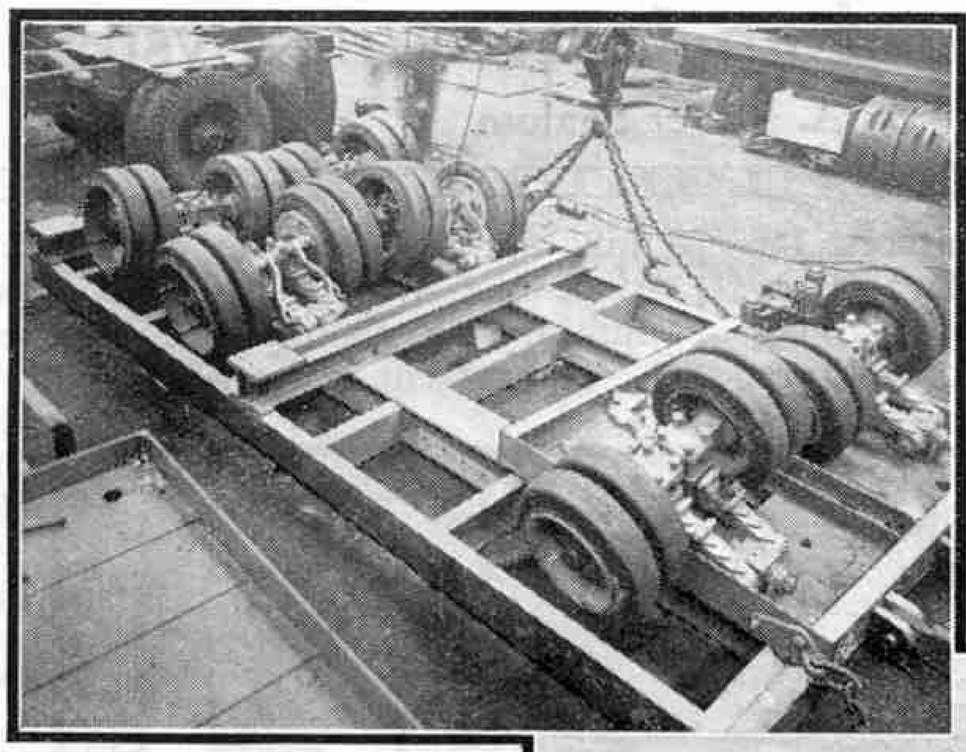
The upper illustrations on this page show a 40-ton low loading trailer designed for carrying highly concentrated loads, such as transformers. The trailer is 16 ft. in length and 8 ft. wide, and has the very low loading height of 2 ft. 7½ in. It was built by R. A. Dyson and Co. Ltd., Liverpool, for the Johannesburg Municipality.

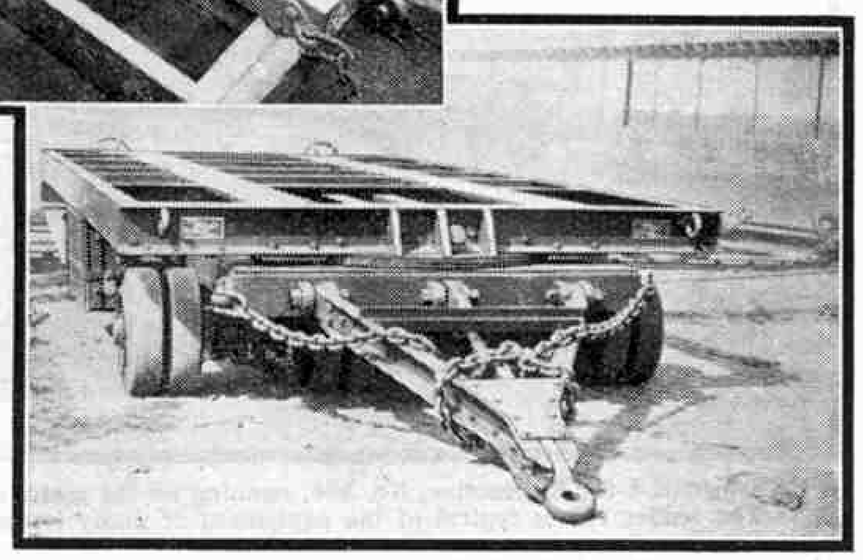
The trailer was supplied in chassis form, and the body, which consists of ½ in. chequered steel plate, was fitted in South Africa. It has 12 wheels, four at the front in line, and two lines of four at the rear, each being equipped with twin tyres. The wheels are steel castings, and are mounted on axles in such a manner as to ensure their being kept rigidly in line.

Each axle is fitted with two springs, which are capable of oscillating to allow the wheels to conform to lumps, ruts and other irregularities in the road surface when travelling over rough country. Brakes are provided on one line of wheels at the rear, and are operated in pairs by independent hand brake screws and wheels at the rear of the trailer.

To steady the trailer while it is being loaded or discharged, six hydraulic jacks are supplied, three of which are placed on each side of the vehicle. When not in use the jacks are carried in special boxes.

To ensure safety in the handling of such a heavy vehicle the Dyson Patented three-piece drawbar is fitted. In this design the centre leg of the drawbar takes all the pull, whilst the side members simply actuate the lock. Safety chains also are provided.





The illustration on the right shows the 12-wheeled 40-ton trailer described on this page. It is fitted with oscillating axles, the arrangement of which can be seen in the illustration above. Photographs by courtesy of R. A. Dyson and Co. Ltd., Liverpool.

Testing the Strength of a Bridge

An old brick arch bridge built to carry road traffic over the Stratford-on-Avon Canal at Birmingham, is to be replaced with a new bridge of reinforced concrete. Before it is demolished, however, experiments are to be made by the Building Research Station of the Department of Industrial and Scientific Research to ascertain the strength of the bridge. The Ministry of Transport is collecting information regarding the strength of various types of bridges, and this Birmingham bridge is among those that are to be tested to breaking point.

To enable the experiment to be made without closing the route, the first half of the new bridge will be built adjacent to the old one and connected to the existing approaches by means of a temporary roadway.

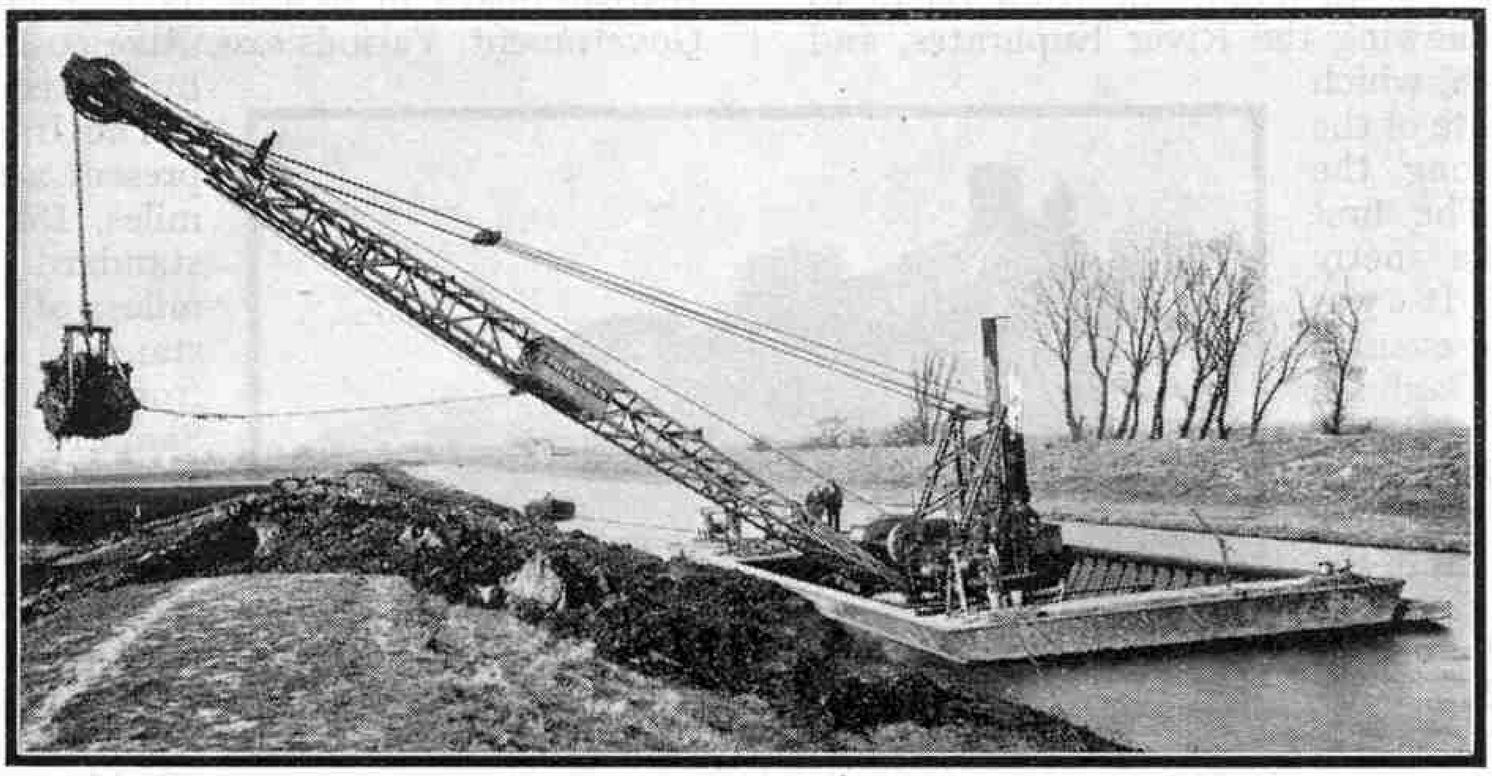
A New Funicular Railway

A funicular railway that will rise to a height of 3,000 ft. in a distance of 1½ miles is now being built from the Bernina Pass above Pontresina, Switzerland, to the Diavolezza Glacier. The new railway will connect with the Bernina line running from St. Moritz past Celerina and Pontresina over the Bernina Pass into Italy, and will cost about £100,000 to build.

Largest German Motor Road Bridge

The largest of all the many bridges so far erected in connection with the construction of the new German motor roads is being built near Limburgam-Lahn. The bridge will measure 1,500 ft. from end to end, and will stand nearly 200 ft. high. It will consist of 13 arches, each having a span of 90 ft.

The new bridge is being erected near the 700-year-old Cathedral of Limburg, and will provide a striking contrast with that ancient edifice.



A Priestman Dredging Crane at work on the Great Ouse. An article describing this work, and the machines engaged in it, appeared on page 684 of the "M.M." for December 1936. Photograph by courtesy of Priestman Bros. Ltd., Hull.

Extensions to Battersea Power Station

Extensions costing about £1,500,000 are to be made to the Battersea Power Station of the London Power Company. This work constitutes the beginning of the second half of the station, the first half of which is complete and in operation. The Central Electricity Board has authorised the company to install plant with a generating capacity of 100,000 kW. This will include a 16,000 kW high-pressure turbo-alternator, a 78,000 kW low-pressure set and a 6,000 kW house set.

More Hydro-Electric Schemes

Work is at present in progress on several large hydro-electric power schemes in various parts of the world. In Russia several power stations are being built on the Volga to develop an annual output of 50,000 million kW. A new section of this scheme now to be commenced includes the building of a dam on the Volga that will increase the depth of the river above it by about 100 ft. Two generating plants are to be built, one of 1,500,000 kW capacity at the dam, and the other of 1,000,000 kW capacity, which will be situated about 62 miles downstream. These two stations will be capable of producing annually 14,000 million kW of electric energy.

Another interesting scheme is to be carried out in the Laxapana Valley, Ceylon. This entails the construction of a dam 345 ft. long, the top of which will be 94 ft. above the level of the original river bed, and 2,844 ft. above sea level. The water from the lake formed behind the dam will be conveyed through a tunnel 7,863 ft. long, to a surge chamber on the hillside, and from there it will be conducted through pipe-lines to a power station 1,500 ft. below.

The power station will house three turbines coupled direct to 11,000-volt three-phase alternators, which will produce 25,000 kW.

German Buses de Luxe

Road coaches equipped with restaurants in which tea, coffee, wines, chocolates, eggs and cold meat will be served, are being placed in service in West Germany. These great vehicles seat 35 persons, and the dining saloon is a separate compartment containing a table for eight. A well-equipped library is also carried.

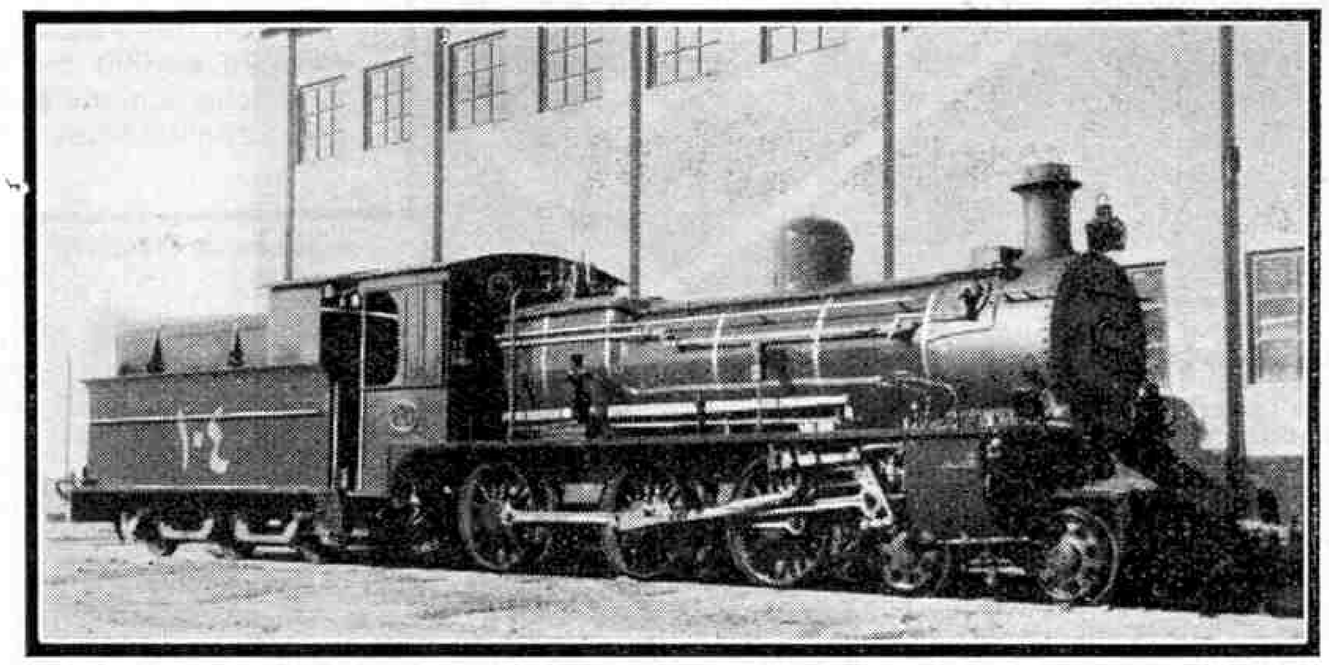
Sleeper coaches also are becoming popular in certain parts of the country. These are luxury saloons fitted with specially built seats that can be reversed in a few moments to form comfortable beds. Radio equipment is provided for the entertainment of passengers during the day.

The Railways of Iraq

The Growth of an Interesting System

By A. Meyer Shalom

THE story of the Iraq Railways is of special interest, for the whole of their development has taken place within less than 25 years. The present system has grown largely from the lines of various gauges constructed for military purposes during the Great War. The first line in Mesopotamia, as Iraq was formerly known, was built earlier, however, when the country was under Turkish rule. This was a German enterprise of standard gauge, running over the 74 miles from Baghdad to Samarra, its course being roughly parallel to the River Tigris. It was built for political and strategic reasons, the idea being to complete rail communication between Berlin and Baghdad by way of Constantinople, Aleppo in Syria and Mosul in the North of Iraq, and for this reason it was known as the Berlin-Baghdad Railway. The Great War put a stop to the scheme.



A British-built 4-6-0 locomotive, No. 104, running on the metre gauge system of the Iraq Railways. The tender cab is typical of the equipment of many locomotives in tropical countries.

Rail transport was soon found to be necessary for the conduct of the British campaign in Mesopotamia during the War. River transport on the Tigris was slow and two lines of railway were put in hand, one from Basra to Nasiriyah, roughly following the River Euphrates, and the other from Qurnah, which is near the supposed site of the Garden of Eden, along the Tigris to Amarah. The first line was laid to the metre gauge, 3 ft. $3\frac{3}{8}$ in. It was thought that it would eventually join up with the Baghdad line, however, and it was laid on standard gauge sleepers so that only one rail would have to be moved in the event of the conversion of the gauge.

A 2-8-0 locomotive of German design on the standard gauge section of the Iraq Railways. This is one of the largest passenger engines on the system

At first the Amarah line was laid to a gauge of 2 ft. 6 in., but traffic was so heavy that it was soon converted to metre gauge, and eventually rail communication was completed from Basra to Qurnah. The use of various gauges requires some explanation, but was due to the fact that much of the rolling stock and material was brought from India, where different gauges were in use. Later the metre gauge was standardised for Mesopotamian use.

Another 2 ft. 6 in. gauge line afterwards converted to metre gauge was that from Kut-el-Amarah to Baghdad. Like the Basra to Amarah line, this has been dismantled since the War, as it was considered unsuitable for military or commercial purposes.

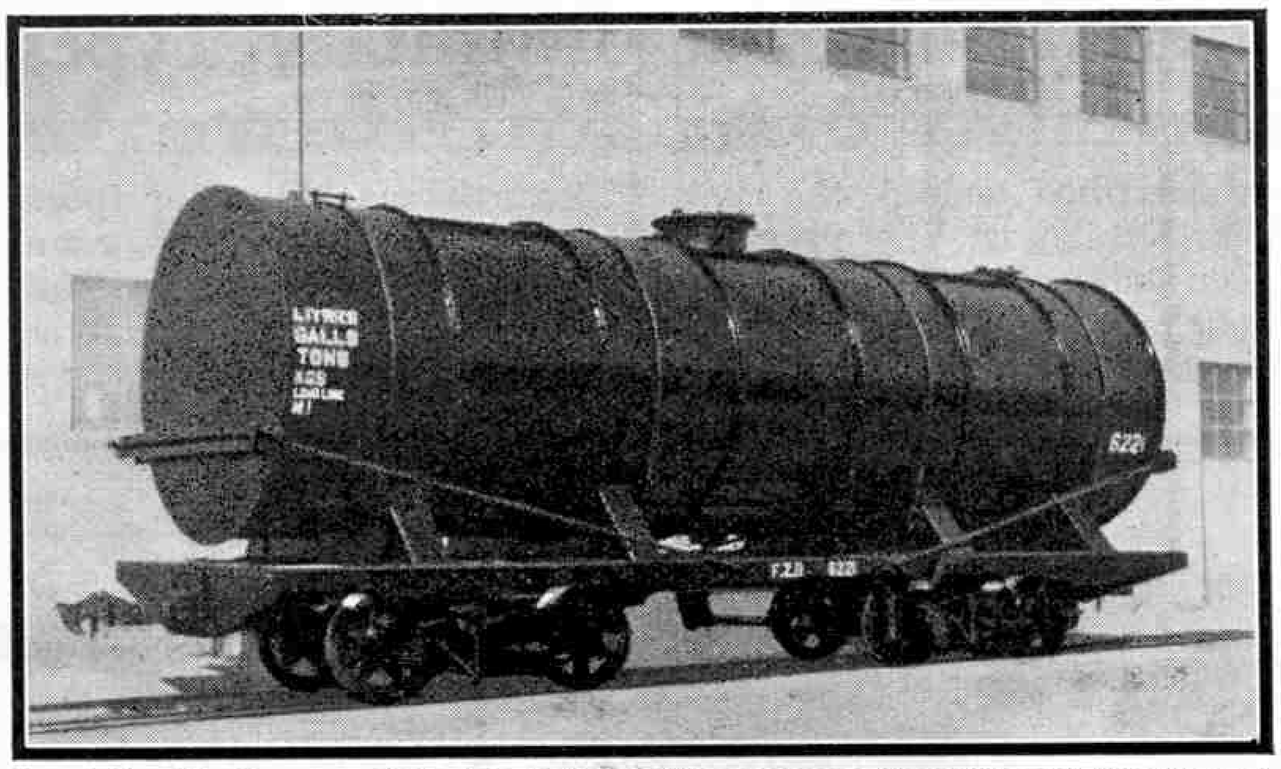
The present metre gauge line connecting Basra with Baghdad follows what may be termed the Euphrates route, and incorporates the section as far as Ur of the first line from Basra to Nasiriyah. Ur was linked up with Hillah, a point to which a line from Baghdad had been brought in 1918. Other extensions were made during the military operations and in the civil administration period that followed.

By an Agreement of 1924 the Iraqi Government became responsible for the administration of the railways, but they continued in British ownership. After prolonged negotiations with the British Government, however, the ownership of the Iraq Railways was at last transferred to the Iraqi Government on 1st April, 1936, at a nominal cash value of £400,000. The agreement reached provides that for a period of 20 years from the date of the transfer of ownership there shall be a partly-British Board of Management appointed by the Iraqi Government. Various executive posts also are to be filled by British officials.

The Iraq Railways have at present a total mileage of 735 miles, 132 miles of which are standard gauge lines and 603 miles of metre gauge. The standard gauge now reaches from Baghdad to Baiji, the Samarra to Baiji section being an extension of the original German-built Baghdad-Berlin Railways. The metre gauge runs from Basra to Baghdad, following in the main the course of the Euphrates. At Hindiyah Barrage, known as "Saddat Al Hinduyah," a branch goes off to Kerbala, a holy city of one of the Mohammedan Sects. The metre gauge line also connects Baghdad with Khanaqin, a city situated on the frontier of Iraq and surrounded by innumerable oil wells. At Qaraghan on this line an important branch completed during the post-War period runs to Kirkuk, 200 miles from Baghdad. From this point a fleet of beautifully-appointed Rolls-Royce cars owned by the Iraq Railways at present link the system twice a week

with Simplon and Taurus Expresses at Tel Kotchek, in Syria.

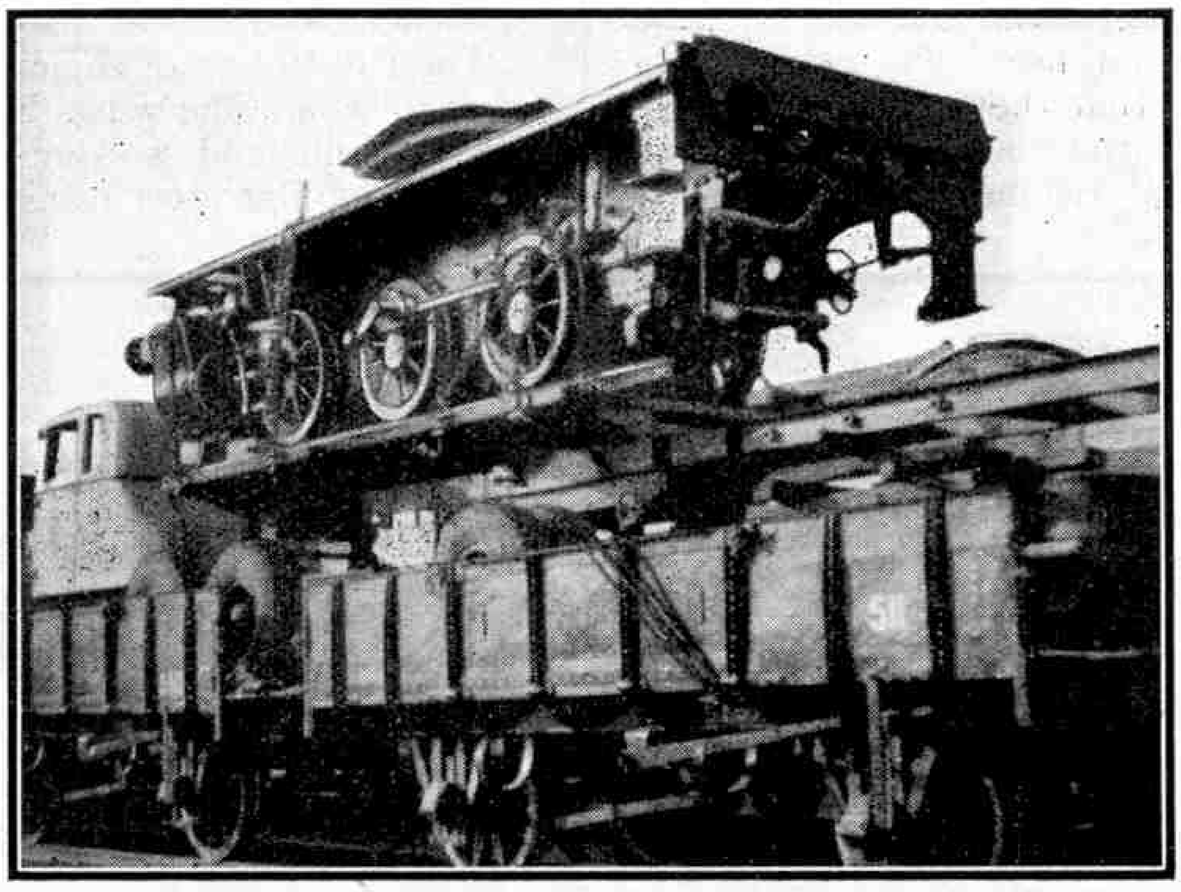
In order to provide through rail connection between Iraq and Europe, the Iraqi Government have determined to extend the standard gauge Baghdad-Baiji line to Mosul, and further on from Mosul to the Iraqi-Syrian frontier. The laying down of the first rail at Baiji was officially performed last November by the Prime Minister of Iraq in the presence of other ministers, the Director-General of Railways and other high officials of the Iraq Railway Directorate.



One of the oil tank wagons of the Iraq Railways. The absence of side buffers and the use of the combined centre buffer and coupling is characteristic of narrow gauge practice.

This 176-mile line follows principally the German survey made prior to the Great War. In due course when the track has reached Mosul, the four principal cities of Iraq will be connected by rail for the first time. It will take probably a couple of years to complete the construction, and to reach the Syrian frontier at Tel Kotchek. It will then be possible for travellers and tourists from London or Paris to reach Mosul, the ancient religious centre, Baghdad, the capital, Kirkuk, the city of oil, and finally Basra, the "Venice of the East," by through railway service with only a single break to cross the Bosphorus by ferry.

The Iraq Railways, besides connecting most of the important cities in Iraq afford tourists the means of visiting the famous ancient ruins in Iraq, such as Babylon and Ur of the Chaldees, the birthplace of Abraham. Railway "Rest Houses" with modern equipment and furnishing are maintained for the comfort of tourists and passengers at Hillah, Dinwaniyah, Ur of the Chaldees, now the junction for Nasiriyah, and Basra. The Railways have some splendid passenger coaches, and luxurious dining cars and saloons have been built at their own workshops at Schalchiyah.



Road and rail transport combined! The underframe of a locomotive for work on the Baiji-Tel Kotchek section loaded on to a lorry being transported to the railhead.

There are six locomotive depots, of which two are engine-changing stations. One of these is at Ur Junction and the other at Qaraghan Junction, mid-way between Baghdad and Kirkuk, a section in which every train has to pass through Table Mountain Tunnel, which is a quarter of a mile long. The maximum speed now allowed is 35 m.p.h., but with the gradually improving conditions of the road, there is a possibility of running at 40 m.p.h. in the near future. The locomotives used are of British make, manufactured by various firms, but over the standard gauge system German engines still hold their own. Every engine is sent to the Railway Mechanical Workshops at Schalchiyah for overhauls every three years, or normally after having completed a mileage of 100,000.

The Railway staff includes British, Indians and Iraqis, most of the official posts being in British hands. The training of Iraqis is going on on a large scale, and 90 per cent. of the clerical staff, as well as traffic and running staff, are Iraqis. On the mechanical side there is a shortage of highly-skilled Iraqi labour, but this will be remedied in the course of a few years when students who are being sent to Europe to take up special courses in engineering and management return to Iraq.

Although the Iraq Railway system is not as fully developed as the modern railway lines of European countries, the accommodation and facilities on the Iraq Railways compare very well with those of the railways of other Arab countries. A fast mail service has been established to travel over the 353 miles between Baghdad and Basra in 12 hours, and the whole system, with its developments well in hand, can safely be said to be one of the greatest assets to the country.

The Iraq Railways carry passengers with comfort and comparative speed, and transport all kinds of freight from livestock to grains, oils and dates. During the construction of the Iraq-Mediterranean Pipe Line of the Iraq Petroleum Co. Ltd., thousands of tons of pipes were transported over both the metre and standard gauge sections, to Kirkuk and Baiji respectively.

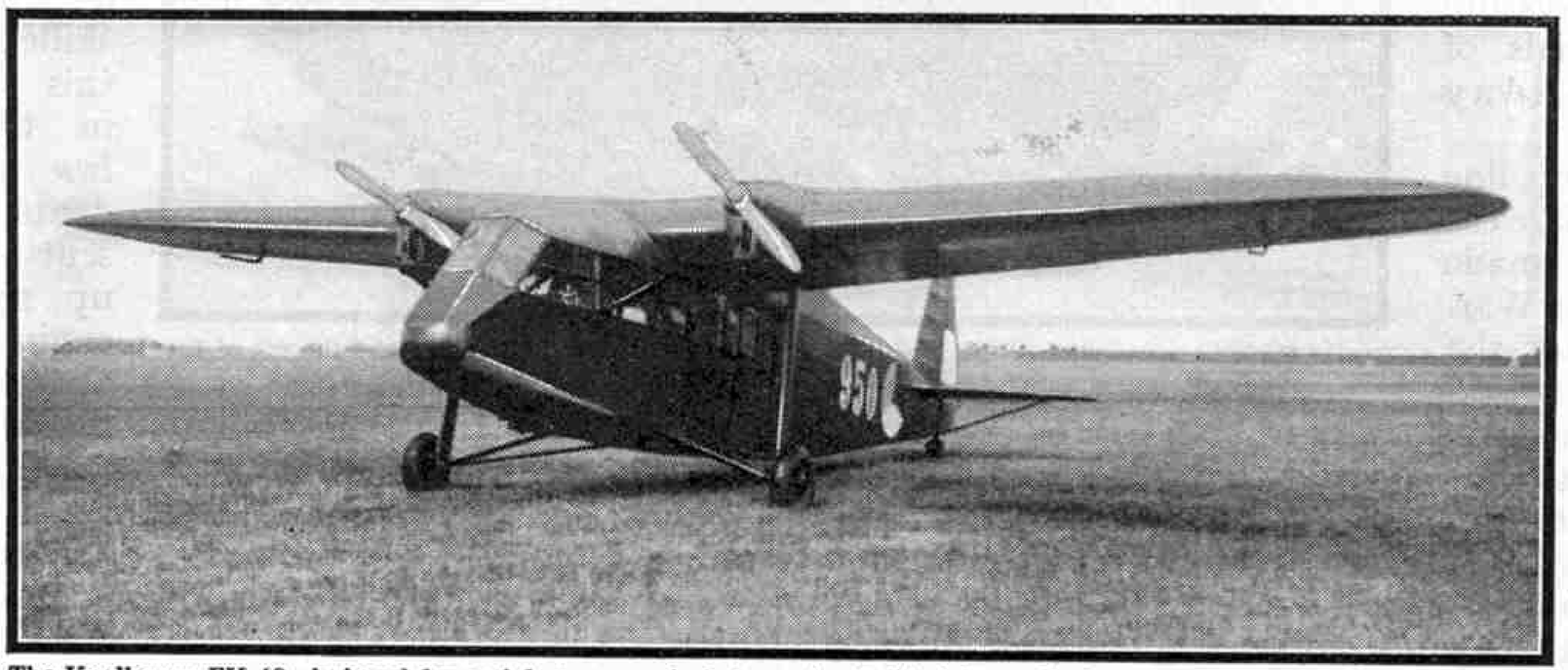
Iraq has a large number of holy shrines at different places such as Kerbala, Najaf or Kadhimain. This means a considerable revenue to the Iraq Railways through the pilgrimages undertaken to such holy places. Pilgrims frequently come from India and Iran, or Persia, as well as from other Arab countries. At the holy city of Kerbala, the number of local inhabitants and others who journey by train to celebrate the two large festivals falling in the year has often risen to 60,000, and during festivals extra trains are run.

There are 58 stations, the main ones being Baghdad West and Baghdad North Stations, Maqil Station at Basra, Kirkuk and Khanaqin. Passenger fares and freight rates are extremely low over all parts of the system, in order to compete both with river and motor transport.

More Netherlands Aircraft

Aerial Survey and Military Types

IN our July 1937 issue we described some of the civil aircraft produced by N. V. Koolhoven Vlietuigen, of Rotterdam, one of the pioneer Dutch aircraft companies. This month we deal with four more Koolhoven aircraft. Three of these are military types. The fourth is the FK 49, shown in the upper photograph on this page. This machine is of special interest, as it has been designed and built for aerial survey and photography, and not merely adapted for these purposes. The utmost care therefore has been taken to make it as stable and steady as possible, so as to ensure absolute accuracy of the surveys; and vibration of any kind and under any condition has been eliminated.



The Koolhoven FK 49, designed for aerial survey and photography. Behind the cabin is a dark room in which to reload the camera plate-holders. The illustrations to this article are reproduced by courtesy of N. V. Koolhoven Vlietuigen, Rotterdam.

The FK 49 does not differ externally from other twin-engined high wing monoplanes, but the interior arrangements reveal its special uses. The cabin seats three people, and is so large that they can move about unhindered when at work; in the floor are openings for the photographic equipment. Behind is a large dark room, where the camera plate-holders are emptied and refilled, and then passed back into the cabin through a special light-proof cupboard. The cabin has an excellent heating and ventilation system, and a telephone keeps the occupants in touch with the pilot in the cockpit in the nose of the fuselage. The cockpit equipment includes dual control, and a radio transmitter and receiver, the operator of which sits near the pilot. The windows are of unbreakable glass, and there is a sliding panel in the windscreen with an electric wiper.

An aeroplane engaged on aerial survey and photography must fly comparatively slowly. The two engines of the FK 49 are 130 h.p. D.H. "Gipsy Majors," which give the machine a top speed of 126 m.p.h. The cruising speed, with the engines running at 80 per cent. of their full power, is 111 m.p.h. The service ceiling is 14,108 ft., and sufficient fuel is carried for a non-stop flight of 491 miles. The landing speed is 46 m.p.h.

A faster version of the machine has been obtained by employing two D.H. "Gipsy Six" engines of 205 h.p., and with these the top speed is 147 m.p.h. and the range 621 miles. The higher speed and greater range make it practicable to use the aeroplane for other purposes than survey work. It can be adapted for use as an air liner by equipping the cabin with seats for six passengers, or arranged as an air ambulance, the cabin then being provided with four stretchers and a seat for an attendant.

The FK 49 has an engine mounted in the leading edge of each wing. The wings are built of wood, with three-ply covering and wooden ailerons. The fuselage has a welded tubular steel framework, and the front portion is covered with metal sheeting and the rear part with fabric. The undercarriage is of the fixed, wide track type fitted to most types of the company's civil aircraft.

Broadside view of the FK 50B, a twin-engined long range bomber. It is armed with three machine guns, one of which occupies the gun turret in the nose of the fuselage.

The three military types of Koolhoven aircraft illustrated differ in many respects. The FK 50B, shown on this page, is the largest aeroplane produced by the company, and from a military point of view the most formidable. It is a twin-engined bomber with a range of 715 miles. The pilot's cockpit is slightly above and in front of the wings, and provides the best possible outlook in all directions. Immediately below the cockpit is the station of the commander, with bomb-sight, bomb release and duplicate steering gear. One machine gun is mounted in a revolving turret in the

nose of the fuselage, and a second in the top decking of the fuselage, where it is covered with a hinged panel that when open protects the gunner against the airstream. A third gun is installed in the bottom of the fuselage. The firing angles of the three guns show that the aeroplane has no blind spots, and therefore can defend itself against attack from any quarter, a factor that makes it a formidable opponent for fighter aircraft.

In addition to being effectively armed, the FK 50B has the high maximum speed of 250 m.p.h. at 14,436 ft. Bristol "Mercurys" of 830 h.p. are the standard equipment, and the two engines are fitted in the leading edge of the wings, in interchangeable mountings of welded tubular steel. Controllable-pitch airscrews are used, and the engines are started electrically. The fuel tanks are between the wing spars, and there is one tank for each engine. The wings are of wood, with three-ply covering and duralumin ailerons. The fuselage is of welded tubular steel, with fabric covering, and the underside is cut away sharply for the third gun position. The undercarriage is retracted into the underside of the engine nacelles when the bomber is in flight.

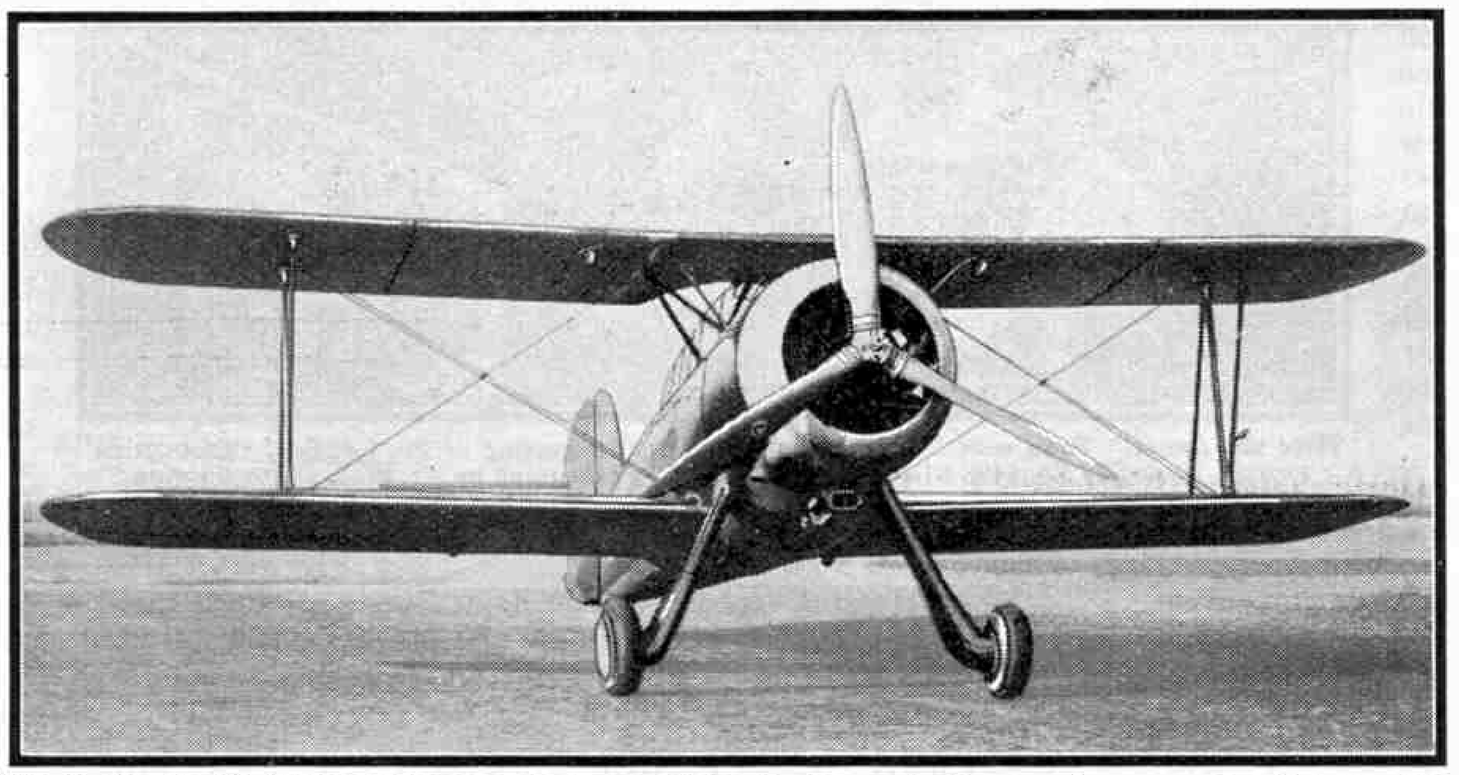
The FK 51 trainer, which can be used for instruction, aerobatics, radio operation, bombing and aerial photography.

The second military type illustrated is the FK 51, a training biplane that has proved its value in most severe tests. It is unusually adaptable, and can be used for ordinary flying instruction, for training in aerobatics, or for bombing, photography, or radio operation. The undercarriage can easily be replaced by floats, and the machine is then suitable for instruction in seaplane flying.

In war the FK 51 could render good service on reconnaissance, Army co-operation duties, or as a light bomber. It has two machine guns, one built in the upper wing and the other in the rear cockpit on a special support patented by the Koolhoven company. Fittings are provided on the bottom of the fuselage on which to carry bomb-racks of the standard type.

The flying qualities of this aeroplane are excellent, and it is possible to put it, fully loaded, through the whole range of modern aerobatics. It is a staggered biplane, the upper wing being slightly forward of the lower one. The wings are of equal span and of similar construction to those of the FK 50B. The fuselage is built on normal Koolhoven lines, and is covered with detachable three-ply panels as far as the rear cockpit, and with fabric from there to the stern. The standard power plant is an Armstrong Siddeley 350 h.p. "Cheetah IX," and this gives the aeroplane a top speed of 157 m.p.h. at 7,218 ft. The cruising speed at the same height is 142 m.p.h., and at that speed the aeroplane has a range of 513 miles.

The Koolhoven FK 52, shown in the lower illustration on this page, is a two-seater general purpose fighter of outstanding performance in regard to speed, climb and manœuvrability. It remains controllable at well below stalling speed, and this permits slow landing in confined spaces, which is a great advantage when the aeroplane is in active service. The two cockpits are in tandem, and are under one roof so that the pilot and the gunner can talk to each other without difficulty. The roof is of unbreakable glass, and the rear portion can be folded down when necessary, to provide an unobstructed area for the movement of the rear machine gun. Both cockpits are equipped with bomb-release gear. There are two machine guns built in the upper wings, and these are operated by the pilot.



The Koolhoven FK 52 two-seater general purpose fighter. The two cockpits are under one roof so that the pilot and gunner can talk to each other without difficulty.

The FK 52 is a staggered biplane and is similar in construction to the FK 51. The fuselage is covered with detachable three-ply panels on the sides. The engine employed is a Bristol "Mercury" of the same power as that fitted in the FK 50B long-range bomber, and the top speed of the aeroplane is 240 m.p.h. at 14,436 ft. The cruising speed is 208 m.p.h. at 12,467 ft., and the range at that height is 652 miles. The service ceiling is 30,184 ft.

Another interesting Koolhoven aeroplane is the FK 55 single-seater fighter. It is a single engined high wing monoplane, and a novel feature is the use of two airscrews that rotate in opposite directions. This eliminates the adverse effect of airscrew torque, and makes the aeroplane very light and easy to take-off. The FK 55 is armed with a cannon that fires through the airscrew shaft, and either two or four machine guns, which fire outside the radius of the airscrew.

L.M.S. Winter Accelerations

With the introduction of the new winter timetable, the L.M.S. have inaugurated the most drastic Midland Division speed-up on record and the most important timetable revision since grouping. This speed-up has been made possible by the introduction of the latest 4–6–0 locomotives, and is the outcome of trials that took place over these routes last April and were described in the June *"M.M."* Cuts up to 40 min. per train have been effected in the running times between St. Pancras, Leicester, Nottingham, Sheffield, Leeds and Bradford.

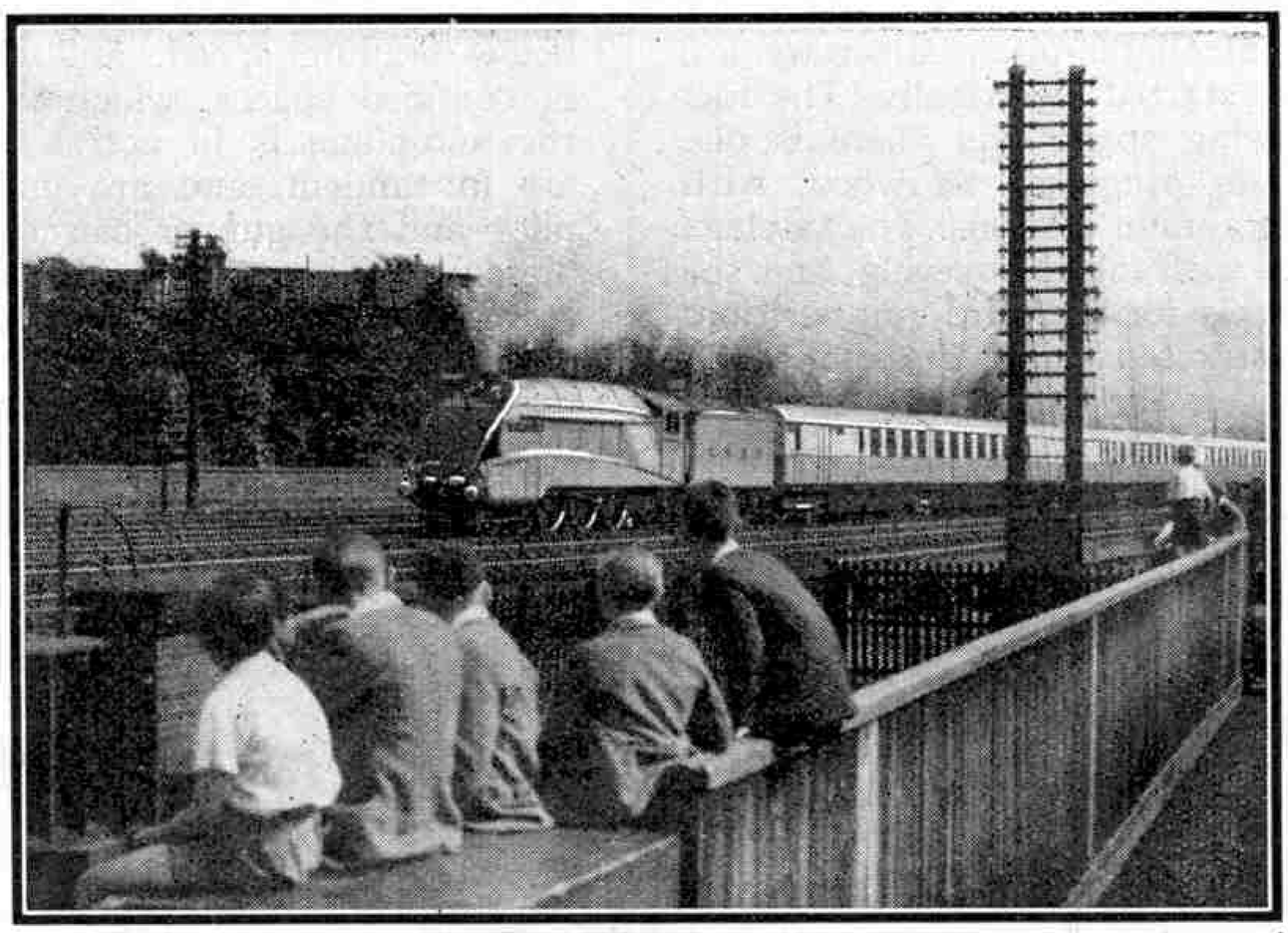
The express service between St. Pancras and Manchester (Central) via Leicester and Derby has been completely reorganised, the fastest overall time by this route being reduced by 20 min. northbound to 3 hr. 35 min. This is 5 min. faster than the fastest of pre-War days; it includes two stops, at Leicester and Derby respectively, however, and the previous fastest time was made with only one stop at Leicester. A new restaurant car express leaves Manchester (Central) at 6.20 p.m. and arrives at St. Pancras at 9.57 p.m., with stops at Derby and Leicester only. It provides a later service from Manchester to London and relieves the heavily-loaded Western Division express, *"The Comet,"* which leaves London Road for Euston at 5.45 p.m.

A new non-stop service has been introduced for business men travelling between Sheffield and London. The up train leaves Sheffield at 10.43 a.m. and the down train leaves St. Pancras at 5.10 p.m., each covering the 158¼ miles in 2 hr. 52 min. Both Leicester and Nottingham have series of non-stop expresses to and from London scheduled at over 60 m.p.h. start-to-stop at various times of the day. This distribution of the fastest services throughout the day is one of the notable features of the new L.M.S. timetable, which show a total of 62 trains with start-to-stop average speeds of 60 m.p.h. or more. These new high-speed trains cover an average daily mileage of 6,145, as compared with the 29 trains and 2,633 miles per day last winter. Only six years ago there were no 60 m.p.h. trains on the L.M.S. system.

The numerous speed restrictions in force north of Trent and Nottingham prevent the same degree of acceleration between these points and Leeds and Bradford as is achieved in the southern section of the main line. The overall journey times between St. Pancras, Leeds and Bradford benefit considerably, however, by the sweeping accelerations that have been introduced. For instance, the maximum saving in journey time by the 3.30 p.m. from St. Pancras to Sheffield is 20 min., and there are similar savings of 21 min. and 24 min. to Leeds and Bradford respectively. Eight other north-bound services to Yorkshire cities will benefit from 5 min. to 15 min.

An interesting feature of the new timetable is the provision of a 172-min. non-stop service from London to Sheffield by the down *"Yorkshireman,"* while the corresponding up train now travels via Nottingham. Anglo-Scottish services by the Midland route are also speeded up and the *"Thames-Forth Express"* now arrives at St. Pancras 38 min. earlier than previously.

It is possible that the services between Bristol and Leeds via Birmingham, Derby and Sheffield, and between Leeds and Glasgow via Carlisle, Dumfries and Kilmarnock will be accelerated also as a result of the tests that were carried between these places on four successive days last month. Standard locomotives and rolling stock were used for the trials which were run to schedules somewhat faster than the express timings at present in force over the routes concerned.



"Here she comes!" Boys near Harringay interested in the passing of the L.N.E.R. "Coronation" express, hauled by No. 4498 "Dominion of Canada." Photograph by Mr. W. S. Garth, Preston.

Second Birthday of *"The Silver Jubilee"*

On 30th September *"The Silver Jubilee,"* the first L.N.E.R. streamline train, completed two years of service. During that time it made 988 single journeys between King's Cross and Newcastle, conveying 135,370 passengers and covering 263,784 miles. The total distance has been regularly covered at an average speed of 67.8 m.p.h., while at least 75,000 miles have been covered at over 80 m.p.h., and on several occasions 100 m.p.h. has been reached. *"The Silver Jubilee"* has maintained a wonderful record for punctuality, and more than half the arrivals at King's Cross and Newcastle have been from one to five minutes early.

One of the most remarkable features of *"The Silver Jubilee"* train is that although there are five engines allocated for the service there is only one set of seven coaches in existence and this set has been used almost continually since the train was first introduced in 1935.

The success of *"The Silver Jubilee"* led directly to the new streamlined high-speed trains introduced this year, the *"Coronation,"* between London and Edinburgh, and the *"West Riding Limited,"* between Bradford, Leeds and London.

On 23rd September, prior to being placed in regular service on the 27th of that month, the *"West Riding Limited"* made a trial run between Bradford and Barkston South Junction. The maximum speed recorded was over 93 m.p.h. on the outward run. The engine was No. 4495 *"Golden Fleece,"* one of the two streamlined "Pacifics" allocated specially to this train, the other being No. 4496 *"Golden Shuttle."*

The *"West Riding Limited"* consists of four twin articulated units making eight coaches in all with a total weight of 278 tons empty. The train is similar in design to the *"Coronation,"* but there is no "beaver-tail" streamline observation saloon, such as is characteristic of the latter. The reversal of the train at Leeds (Central) makes this impracticable.

The external finish of the train is the same as that of the *"Coronation,"* dark Garter blue being used for the panels below the windows and a lighter blue above, with aluminium paint for the roofs, and raised stainless steel lettering. The underframes are black and the locomotives have red wheels.

Fast Running by a "Hunt" Class 4-4-0

The majority of duties entrusted to the "D49" class 4–4–0s of the L.N.E.R., both of the piston valve type, named after "Shires," and of the R.C. poppet valve series, are in the nature of "intermediate" workings rather than high-speed main line turns. A notable exception in this respect is the 9 a.m. Leeds-Glasgow express which is regularly hauled by a "D49" as far as Newcastle.

On a recent trip No. 370 *"The Rufford,"* most ably driven by Beanland of Neville Hill shed, Leeds, made a very spirited run from York to Newcastle. The load was one of eight coaches, 271 tons tare and 285 tons with passengers and luggage. York was left 3 min. late, but over the faintly rising length to Northallerton no time was regained in spite of a steady average of 62 to 67 m.p.h. After passing Northallerton, 30 miles, in 32¼ min. speed rose to 68 on the level at Danby Wiske, and the 1 in 490/690 rise to Eryholme Junction was mounted at a steady 64½ m.p.h. Touching 75 down Croft bank, *"The Rufford"* was through Darlington, 44 miles, in 45¼ min. at 69 m.p.h. and the rising grades to Aycliffe taken at the excellent minimum speed of 57 m.p.h., but a fast run down past Ferryhill with a top speed of 73 m.p.h. was cut short by the usual slack at Croxdale, on this occasion to 55 m.p.h. Nevertheless Durham, 66 miles, was passed in 67¾ min. at the usual very slow speed.

The train was now less than a minute late, and, after experiencing a severe slowing for pitfall troubles near Plawsworth, there came a brilliant finish into Newcastle. Chester-le-Street was passed at 71 m.p.h., after which *"The Rufford"* raced away to no less than 77½ m.p.h. at Lamesley; so that the 80 miles from York to Newcastle were completed in 82½ min., 1½ min. early, despite the late start of 3 min.

The schedule time for this distance is 87 min., the fastest of the day, excepting of course that of *"The Silver Jubilee."* This run was recorded by Mr. O. S. Nock.

The L.N.E.R. *"East Anglian"*

Two "Sandringham" class locomotives have been streamlined for service on the *"East Anglian,"* which runs between London (Liverpool Street) and Norwich. These are No. 2859 and No. 2870, formerly *"Norwich City"* and *"Manchester City,"* which have been renamed *"East Anglian"* and *"City of London"* respectively.

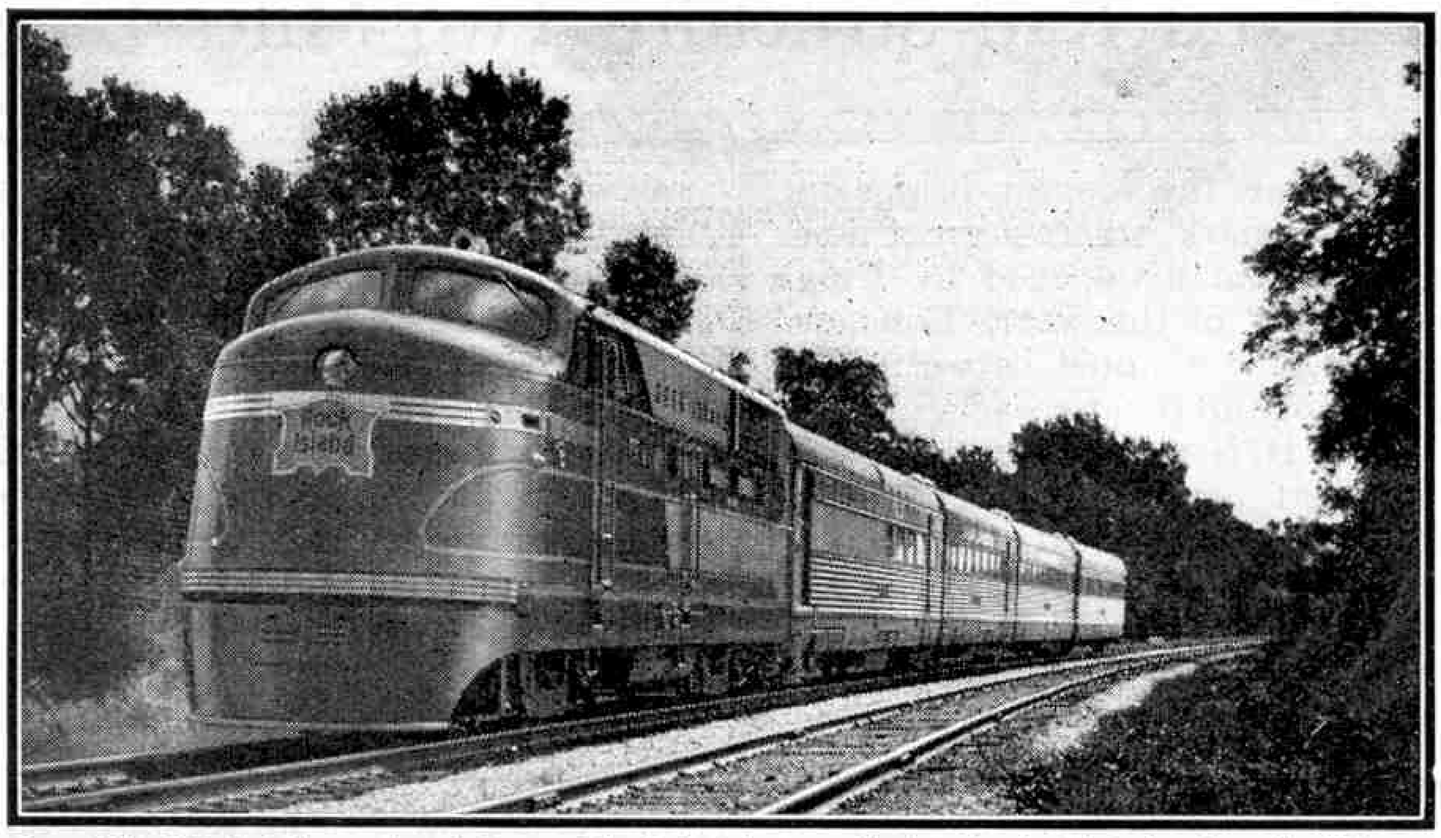
S.R. to Lay More Long Rails

The track in Polhill Tunnel has been relaid with 180 ft. welded rails, of the type already laid in Merstham Quarry Tunnel. Other repair work is being carried out at Hildenborough. To allow these important engineering works to be put in hand it was necessary to close the line between Knockholt and Tonbridge on Sundays during last month. Electric trains between London and Sevenoaks via Orpington ran according to the timetables, but terminated at and returned from Knockholt Station. Between Knockholt and Sevenoaks a bus service was instituted.

Carnforth Station to be Improved

The station at Carnforth, known as the gateway to the Lake District, is to be completely modernised. The scheme includes the construction of a new platform 890 ft. in length, the raising of existing platforms, the provision of new carriage sidings and the replacement of signal boxes Nos. 1 and 2.

When the improvements have been carried out it is anticipated that better services will be provided from Carnforth to the Furness area generally, including Barrow-in-Furness and the seaside resorts of Morecambe, Heysham and Grange-over-Sands.



One of the "Rockets," a series of six new Diesel-electric streamlined trains just introduced on the Chicago, Rock Island and Pacific Railroad for service in the Middle West. The trains are finished externally in stainless steel and include lounge car and dining accommodation. The locomotive develops 1,200 h.p. Photograph by courtesy of the Chicago, Rock Island and Pacific Railroad.

The "Simplon-Orient Express" near St. Denis on the Northern Railway of France. The locomotive is No. 3.1270, one of the remarkably efficient "Super-Pacifics." Photograph by Mr. G. F. Fenino, of Ablon, France.

The Railway Handbook, 1937-8

A reliable source of facts and figures relating to the railway systems of Great Britain and Ireland is always useful, and this description is certainly merited by the 1937-8 issue of *"The Railway Handbook."* Its 96 pages include a great deal of valuable information, but it is not merely a statistical record for it gives details of general interest about each of the four railway companies, the Irish railways and the London Passenger Transport Board. Such details as fastest runs, longest tunnels, greatest altitudes, steepest gradients and so on are included, with notes on locomotives, carriages, wagons, permanent way and signalling.

A brief chronology of British Railways is an interesting feature, in which comparisons are made with the railways of other countries in order to cover such developments as the electrification of steam railways.

There is a good index, a study of which supports the claim of the publishers that the *"Handbook"* forms the only source of reference at the low price of 2/6 in which it is possible to obtain the information given in it. It is published by the Railway Publishing Company Ltd., 33, Tothill Street, Westminster, London, S.W.1.

Central London Tube Extension

The G.W.R. and the L.P.T.B. in conjunction are to extend the "Central London" electric line to Ruislip, a distance of eight miles, while a further extension of three miles will probably be made to Denham. The extension is to leave the existing Ealing and Shepherds Bush line near North Acton by means of the burrowing junction.

The widening of the G.W.R. line from two to four tracks between North Acton and Ruislip and possibly to Denham later on, will allow a proportion of the trains from the "Central London" line to be run over it. This will place Ruislip, Northolt, Greenford and intermediate stations in direct communication with the West End and the City.

In addition to the burrowing junction at North Acton there will be a fly-over junction on the G.W.R. Castlebar loop line at Greenford. A car depot of modern type will be provided between Ruislip and Ruislip Gardens Station.

* * * *

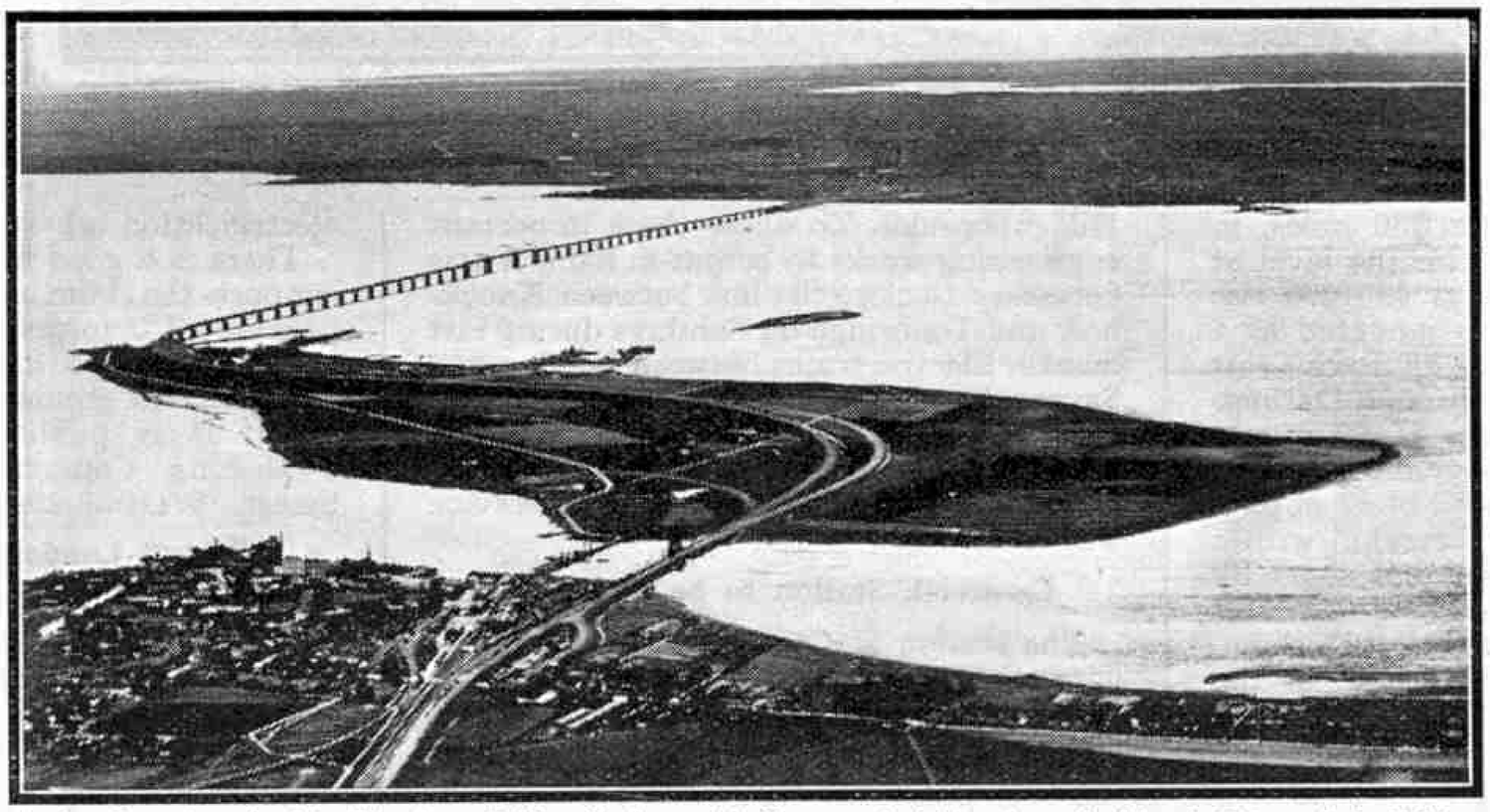
L.M.S. class 5P5F 4–6–0s built by contractors are in service up to No. 5416. Nos. 147–155 of the 2–6–2 passenger tank engines built at Derby are also in service.

The Longest Bridge in Europe

Road and Rail Structure Two Miles Long

THE distinction of possessing the longest bridge in Europe now belongs to Denmark, where a great new structure two miles long was formally opened by King Christian IV on 26th September of this year. The new bridge crosses the Storstrom, the channel between the islands of Falster and Masnedo, and its approaches bring its total length to 2¼ miles. It is a long slender steel structure, carried on 49 great concrete piers. British engineers and British steel played a great part in its construction, which was one of the greatest engineering feats of modern times, for it was erected by Dorman Long and Co. Ltd., Middlesbrough, the builders of Sydney Harbour Bridge and many other famous structures.

There is great need for the building of giant bridges in Denmark. That country consists largely of islands, separated from each other and from the mainland by wide arms of the sea that make communication difficult. Copenhagen, the capital, is on Zealand, the largest of these islands, and until a few years ago was comparatively difficult to reach from European countries, as the waterways between the islands could only be crossed by ferry. The channels were particularly troublesome to railway communications in Denmark. Efforts have been made to overcome the difficulties by means of specially constructed train ferries. These have given excellent service, but time necessarily is lost in shunting trains on or off the ferries, and in winter storms may hold up communication for long periods. The construction of bridges at suitable points prevents delays and interruptions, not only to railway traffic but also to travel by road.



A view from the air of the Storstrom Bridge, the longest in Europe, stretching from the island of Masnedo to Falster in the distance. The total length of the bridge is 2¼ miles. The illustrations to this article are reproduced by courtesy of Dorman Long and Co. Ltd., Middlesbrough.

The new bridge forms part of a scheme to improve the journey by road or rail between Copenhagen and continental centres, such as Berlin, Paris and Hook of Holland, the port for Great Britain. It links two of the islands on this route, and a smaller bridge has been constructed across the channel between Masnedo and Zealand. Now therefore the only place in this route where it is necessary to cross by boat is between the south coast of Falster and the German mainland. This sea passage is 25 miles in width, and is covered by a train ferry that also carries road traffic.

The Storstrom Bridge is wide enough to carry a roadway 18 ft. 4½ in. wide and a path for pedestrians and cyclists that measures 8 ft. 2½ in., as well as a single railway line. It has 50 spans altogether and rises gently from the abutments at each end to three wide spans in the middle of the channel under which shipping can pass. The length of the middle span is 393 ft. 8 in., and that of each of the two on its flanks is 295 ft. 3 in. The largest of the three gives a clearance of 85 ft. for the masts and funnels of vessels making use of the channel, and the others are almost as high, their clearance being only 2 ft. less. The remaining spans are alternately of 189 ft. and 204 ft.

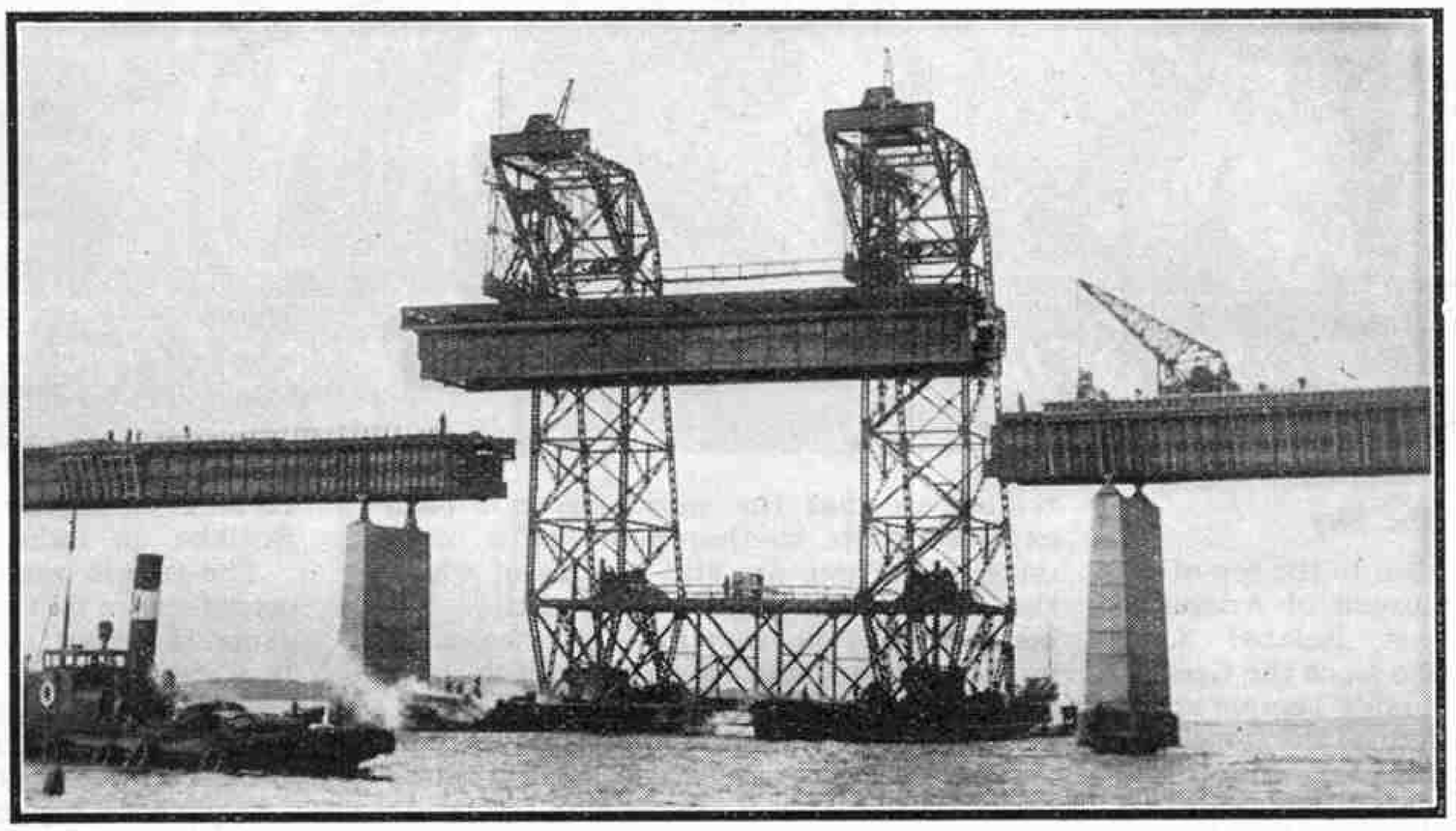
The greatest depth of the Storstrom is 46 ft., although the average is only 23 ft. The rise and fall of the tide usually is only 8 in. to 13 in., and its greatest variation is 6½ ft., so that this gave rise to no trouble during construction. The current sweeping through the channel is sometimes strong, but it also did not seriously hinder work on the bridge. Steel cofferdams and steel sheet piling were used to cut off the water from the sites on which the piers and the abutments at the ends were to be built. The water inside was then removed and the foundations laid. These were sunk well into a bed of firm clay that underlies the bottom of the channel at a depth of 20 ft. to 25 ft.

The piers and abutments are of reinforced concrete, and the actual course of construction varied according to their position. The abutments were built up within a cofferdam of steel sheet piling, and this was left in position as a protection against undercurrents. The piers rest on foundations consisting of huge oval slabs of concrete 10 ft. thick, and they also are protected from currents by steel sheet piles. They are of three different sizes. Those that support the navigation spans in the middle of the river are much larger than the others, and the smallest are in the shallow water at the ends of the bridge.

These piers were built in cofferdams, but an ingenious scheme was worked out by the engineers for the construction of the others. Each was built with the aid of a special standard unit consisting of a floating oval steel staging, fitted with water tanks so that it could be raised or lowered by pumping water out or in. Thus it formed a movable cofferdam. From it steel sheet piles were driven to form a wall round the foundations, and it carried pumps to keep dry the workings inside the steel walls, together with the appliances needed for building the lower segments of the pier under construction. As soon as each

pier reached a certain height the unit was removed, and the rest of the construction carried out in the ordinary manner.

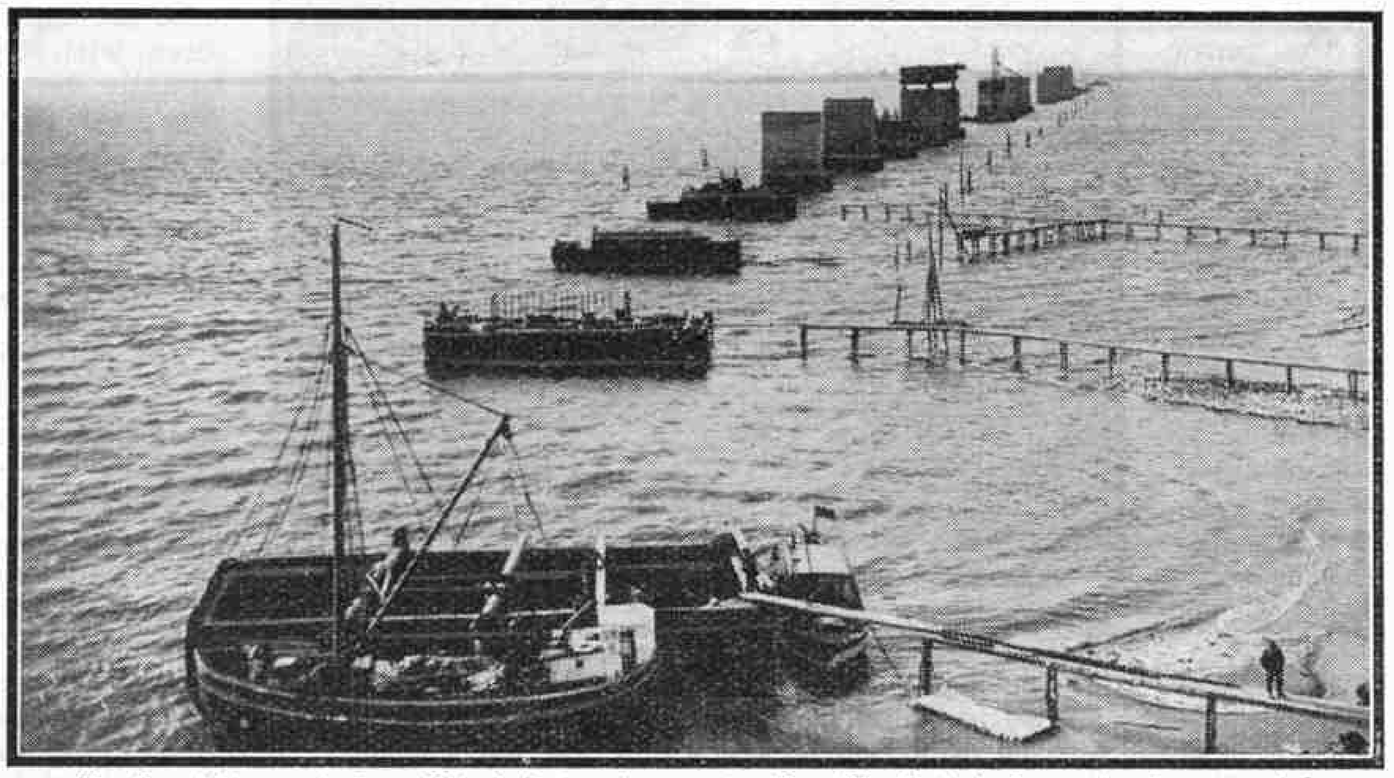
Winter conditions in the Baltic Sea are very severe, and pack ice is then encountered in the Storstrom. In the shallows this may be forced up to heights of 22 ft., and it exerts enormous pressure against any obstruction in its path. For this reason special protection has been given to the great piers by lining them with granite to a depth of 8 ft. below the surface of the water. Cutwaters also have been erected to provide further protection against the pressure of ice and scouring by currents.



The 500-ton floating crane lowering a suspension span into place during the building of the Storstrom bridge. In position it is supported by the cantilever arms of the adjacent spans.

Nearly the whole of the steel used in the construction of the bridge was Dorman Long's high tensile "Chromador Steel," which has a high resistance to corrosion. The steelwork was made at Middlesbrough and shipped in lengths up to 45 ft. in specially chartered steamers, which delivered it to an erection yard on the island of Masnedo. There the spans were built up in readiness for placing in position on the piers of the bridge.

The 47 spans leading up to the three wider navigation spans in the middle are steel plate girders and are of two kinds, known as anchor and suspension spans respectively. They are placed alternately along the bridge. Each anchor span rests on two adjacent piers, and is so long that cantilever arms project from it to a distance of 30 ft. at each end. These arms form supports for the suspension spans, which do not rest directly on the piers. In designing this steelwork great care had to be taken to allow sufficiently for the great changes in temperature to be expected, for it is very cold indeed in the Baltic Sea in winter.



The foundation and piers of the bridge under construction. The first steel span has been erected.

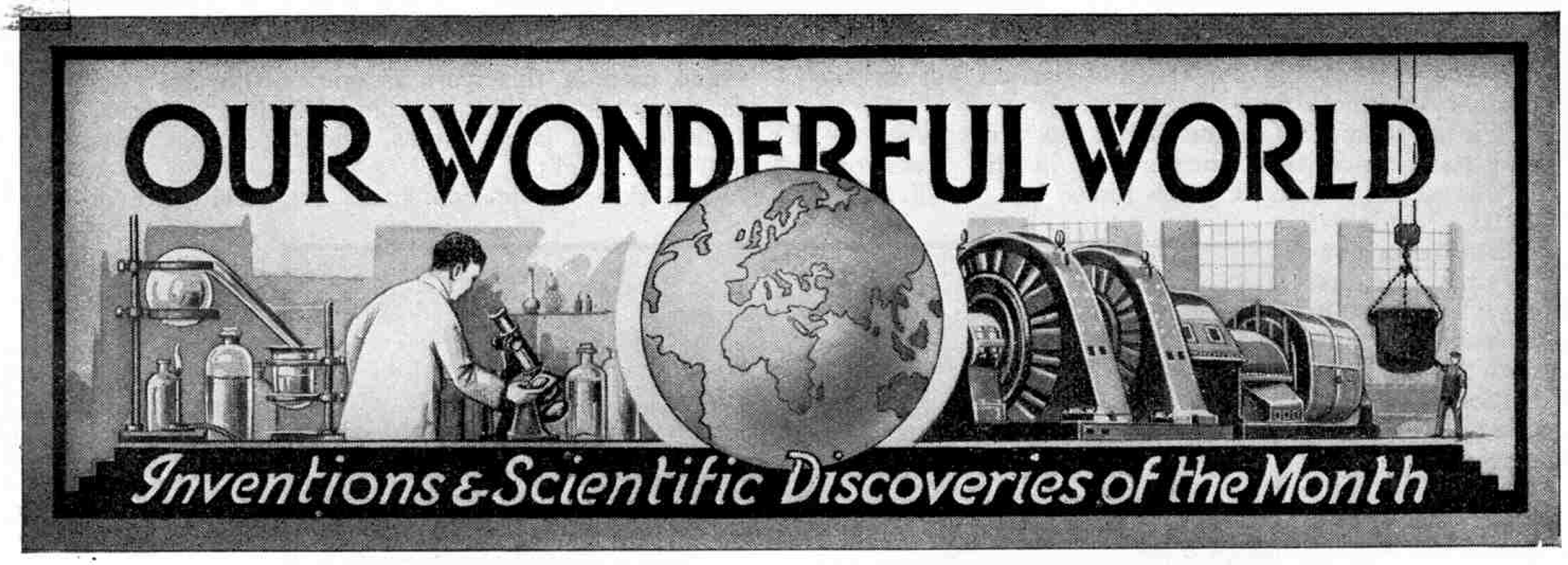
An unusual plan was followed in placing these girder spans in position. Each was built up in the erection yard already referred to, and when completed was rolled out on slipways that took it well away from the shore. There it was picked up by a huge floating crane, which was then towed out to the site of the bridge and manœuvred until the span could be lowered gently into place. The crane was then towed back to the slipway to wait for the next span. The floating crane used in this work is one of the most powerful in the world, and is capable of lifting 500 tons. It is built on two large barges, and its lifting towers are 150 ft. in height.

The three navigation spans are steel plate girders, reinforced by arches. Owing to their great length and weight, it was impossible to lift them directly into position. Instead each was built up in two equal sections. A huge timber trestle, resting on a group of specially driven piles, was placed on the centre of each span in turn, where it acted as a temporary pier. The two halves of the girder span were then rolled out on the slipways and towed to the site in the usual manner, the floating crane depositing each with one end on the pier and the other on the trestle. The two parts were spliced together over the trestle, and this was removed to the next navigation span to enable a similar operation to be carried out there. The construction of this section of the bridge was completed by building up the arches piece by piece from the deck of the span.

The steelwork was left to weather for 12 months, and was then sand-blasted and given three coats of paint. Three structures called "painting travellers," run under the girders of the bridge for use when inspections are to be made or the steelwork is to be repainted.

The narrow waterway between the islands of Masnedo and Zealand is spanned by the smaller bridge seen in the foreground of the illustration on the opposite page. This forms a continuation of the Storstrom Bridge. Provision had to be made for the passing of shipping along the waterway under it, and the bridge therefore has a bascule span giving a navigation opening 82 ft. wide.

The steelwork for this bridge also was made by Dorman Long and Co. Ltd., but was built up ready for assembly by Sir William Arrol and Co. Ltd., Glasgow, who also supplied the machinery for raising and lowering the lifting span. The total weight of steel in the two bridges is about 30,000 tons, of which some 9,000 tons were required for the smaller.



An Island in the Sky

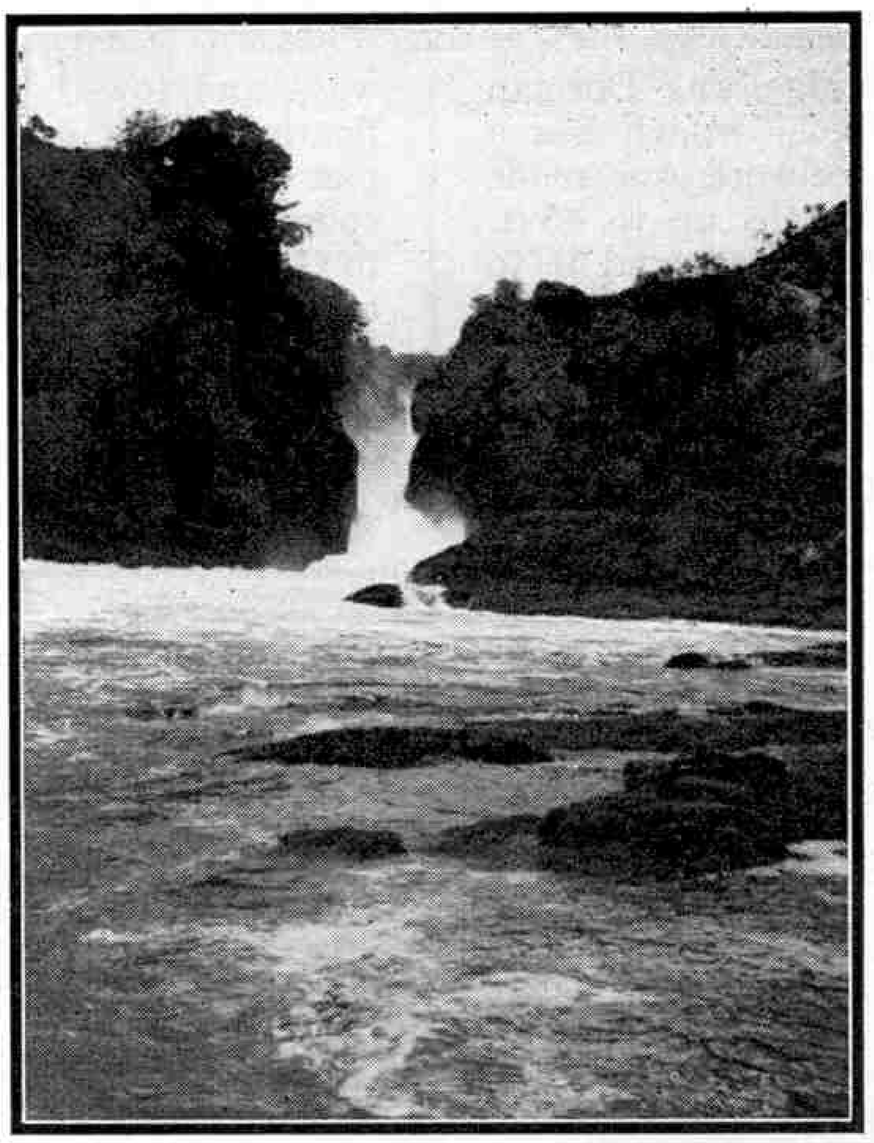
Five men recently climbed to the top of a plateau in the Grand Canyon of Arizona that probably has been isolated for thousands of years, perhaps since the Great Ice Age. It is known as Shiva's Temple and rises 1,200 ft. above the floor of the canyon. Its sides are very steep, and its summit is so completely cut off that it has been described as an island in the sky. Its surface has an area of about a square mile, and is so rugged that it is impossible for an aeroplane to land upon it.

It was thought that the summit of Shiva's Temple might be a miniature "lost world," resembling on a more limited scale the one described in the late Dr. Conan Doyle's romance, in which prehistoric creatures such as the pterodactyl and various dinosaurs survived. No sensational discoveries of this kind were expected in the Grand Canyon, but it was possible that the plateau might yield small reptiles and mammals that had survived from a previous age, and that might be very different in appearance and habits from those of the outer world. Dr. Anthony, the leader of the party, remained for several days on the plateau with one companion, and food, water and other supplies for them were dropped by parachutes from aeroplanes flying over the plateau. Many small animals such as wood rats, white-footed mice, rabbits and squirrels, were found, and there was evidence that deer and larger forms of animal life at one time lived on the plateau, although no living specimens were found. The most interesting news, however, is that stone arrowheads and implements have been discovered. This may indicate that in some by-gone age a primitive tribe of human beings inhabited the island in the sky, which may have been cut off from the rest of the world at a comparatively recent date.

Lost Worlds of the Grand Canyon

When Shiva's Temple has been thoroughly explored the expedition will make an attempt on "Wotan's Throne." This is a second "lost world," separated from the north rim of the canyon by a chasm 1,200 ft. across. Its sides are very precipitous, and it is by no means certain that the proposed ascent is possible. There are several other similar plateaux, as the photograph on the opposite page of the Grand Canyon suggests, and all may yield interesting discoveries.

The fact that these plateaux have for so long been shrouded in mystery serves to remind us that the world has not been explored quite so thoroughly as is often imagined. There are still regions of which the White Man knows very little. For instance, few explorers have yet succeeded in penetrating the tropical forests that cover the Matto Grosso Plateau in Brazil. There unknown tribes and strange animals may well exist, of which the civilised world knows nothing. Further north in the same continent British Guiana, though it is part of the Empire, has not yet been properly surveyed, while many secrets of ancient civilisations still lie buried in the jungles of South America, the scene of Conan Doyle's lost world.



The Murchison Falls, Uganda, on the Nile. The surrounding district is remarkable for game, and an account of the animals that can be seen is given on this page. Photograph by B. A. Soltau.

A Paradise for Game

The illustration on this page shows the Murchison Falls in Central Africa, where the waters of the Nile swerve through a narrow channel and plunge over a precipice several hundred feet in height before resuming their leisurely progress towards the Mediterranean Sea. Until recently the Falls were almost unaccessible, but to-day there is a regular service by boat from Butiaba on Lake Albert.

The trip is remarkable not only for the magnificence of the Falls, but also for the game that can be seen on the way. Mr. B. A. Soltau, of Plymouth, a reader of the *"M.M."* who recently made the trip writes of travelling in "a small launch lined with steel as a protection against inquisitive hippos. In this we chugged slowly up the river, our eyes glued to the banks which were alive with every sort of animal. At first the sides were clogged with papyrus, in which dwelt every variety of river bird, ibis, duck, storks of every colour and description waded or flew around us.

"As the river widened bushes and then trees appeared on the banks. Amongst them moved herds of buck, and close to the water lay crocodiles basking, their cruel jaws agape, their eyes glittering and cold. The first collection of these we saw created a sensation, but before long we were almost tired of the sight of them, they were so numerous. It was the same with the hippos. The water seemed to be alive with them and they would continually be bobbing up to inspect us. The real thrill was the elephants. We must have seen in all four or five herds coming down to the water to drink, moving slowly and majestically along, their trunks continually waving at the flies that annoyed them."

The Swiftest Creature in the World

Naturalists in Brazil are reported to have discovered a remarkable fly that is said to be the world's fastest living creature. It is half an inch in length, in appearance resembling our own honey bee, and is believed capable of a speed in flight of 800 m.p.h., or nearly 1,200 ft. per sec. It seems almost incredible that any creature should move so quickly. It could fly from London to New Zealand between sunrise and sunset, and would take little more than a day to fly round the Earth.

It would be interesting to know how the speed of the fly was measured, for the human eye could not follow it in flight and it would be seen only as a blur. It could scarcely be heard coming towards an observer on the look out for it, for it moves with a speed almost equal to that of sound, and it would arrive at practically the same time as the whirr of its wings! Possibly its speed has been exaggerated. The warble fly was once credited with a speed of 700 m.p.h., but actually does not exceed 40 m.p.h.

Strange American Farms

One of the most interesting animals in the world is the chinchilla, a friendly little creature of the rodent family about the size of a guinea pig. Its home is in the South American Andes, 8,000 ft. above sea level, where it lives in burrows. It is a strict vegetarian, and in its own country was once very unpopular because of the amount of damage it did to crops. Indians therefore hunted it and it became comparatively rare. Now all this is changed, for its beautiful soft pearl-grey fur is highly valued, and is in such demand among furriers in Europe and America that in the United States special farms are devoted to rearing the chinchilla.

The animals on these farms were made to feel at home in California only with the greatest difficulty, and three years were spent in transferring them from their mountain homes to the farms. There they are kept very carefully in wooden huts. Great precautions are taken to keep them in healthy condition, and visitors must walk through shallow pits containing sterilising solutions in order to avoid carrying infectious diseases to them.

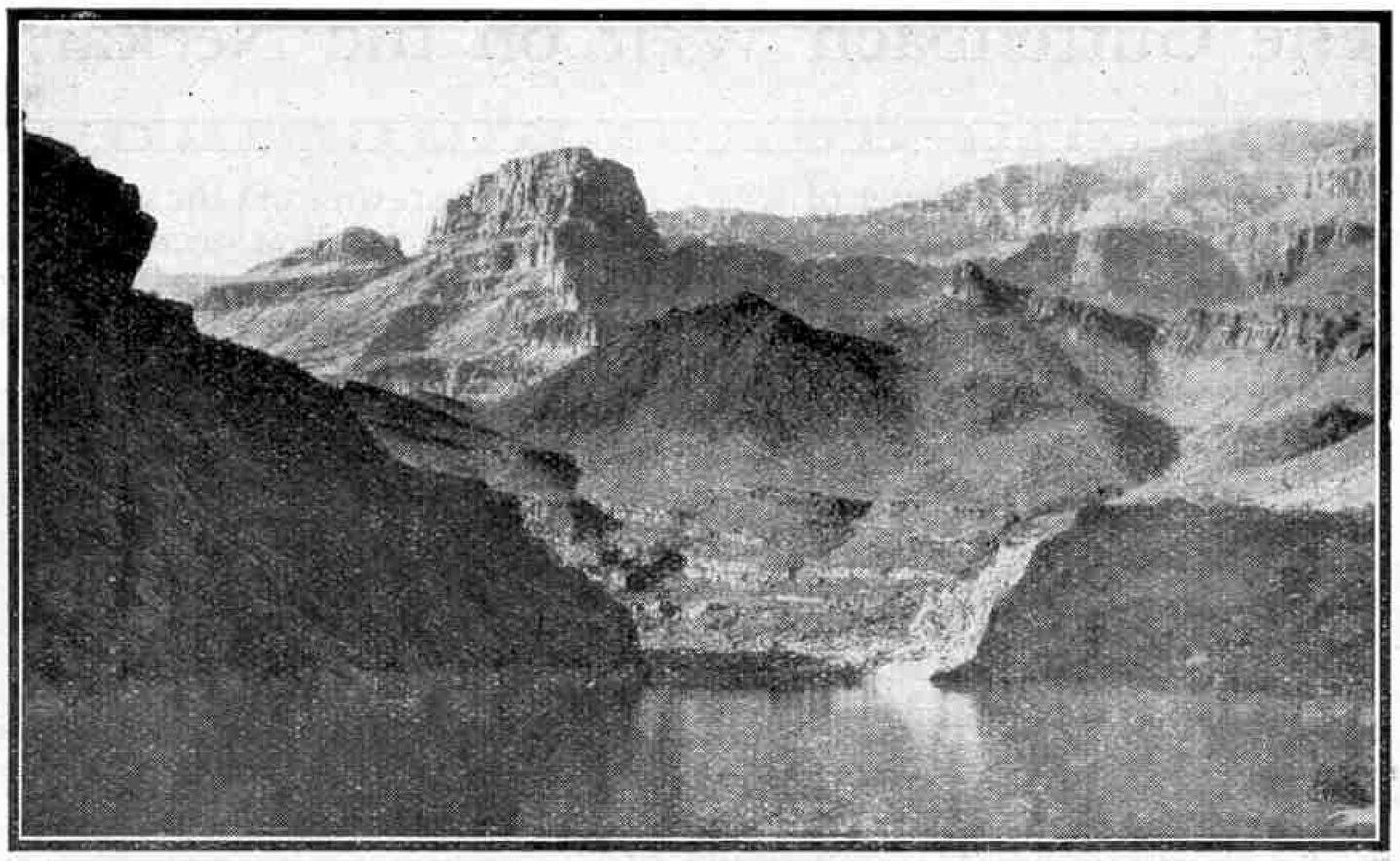
Another curious American farm at Comfort, Texas, the only one of its kind in the world, is devoted to the rearing of the armadillo, a peculiar animal found throughout Central and South America. The largest armadillo has a length of 3 ft. but the smallest kinds sometimes measure no more than 5 in. In appearance they resemble miniature tanks, for they are covered with two heavy bony plates. Although they have only short legs, they can bury themselves very rapidly in the ground. Some specimens also find protection by rolling themselves into a tight round ball, completely concealing their head and feet, and presenting to any enemy only a thick hard mass resembling a cannon ball. They are reared on the farm chiefly for their plates, the material of which can be manufactured into baskets, lamp shades, combs and many other articles.

War in the Insect World

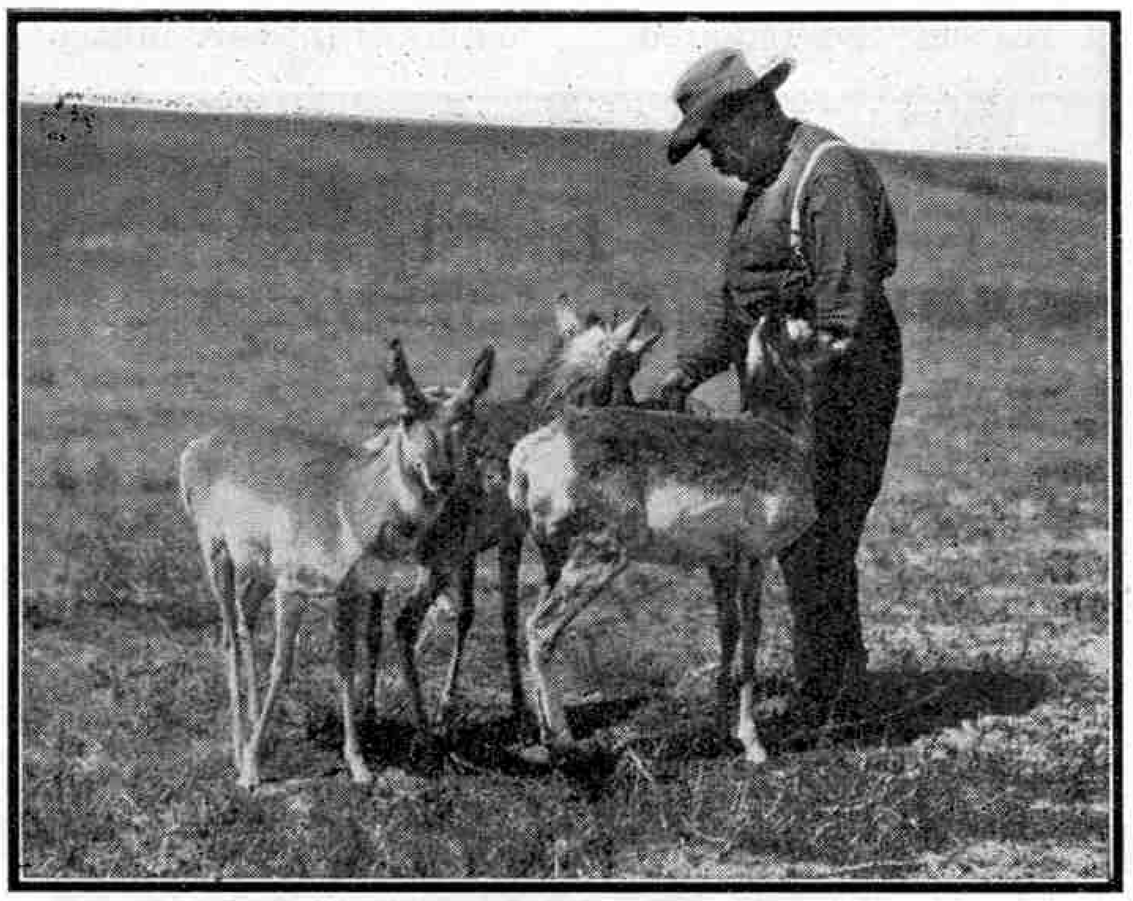
During the last week in September there was war in the insect world at Harborne in Warwickshire. The trouble began when a swarm of wasps attacked a bee-hive and attempted to carry off the honey. The angry bees defended their home, and the resulting battle continued for 10 hours. The fight was ended by smoking out the hive, but by that time nearly 7,000 bees had been killed. The wasps driven off soon attacked another hive and persisted in their assaults until practically every one had been exterminated by the people living in the district, who destroyed their nests. The bees were seriously reduced in numbers, but as the wasps had failed to reach the sealed compartment of the queen bee, the life in the hive continued, and the damage was soon repaired.

A Strange Deep Sea Creature

A sack throated whip-tail was recently discovered floating helplessly on the surface of the Atlantic. Very few specimens of this creature have been found. It is an inhabitant of the Atlantic Ocean, in which it lives at depths of about 1,000 fathoms. Its jaws are provided with slender curved teeth and it can distend its body to such an extent that it is capable of swallowing large fishes. The one found in the Atlantic had been too venturesome in this respect for it had been choked as a result of trying to swallow a fish that was considerably larger than itself.



A scene in the Grand Canyon of the Colorado. One of the steep-sided plateaux of the kind referred to on the opposite page can be seen.



Antelope in the Nemiskamo National Park, Canada. These creatures once roamed freely in North America. They are among the shyest of animals, being more timid than deer, but become trustful in captivity.

Sharks in British Waters

Much has been heard recently of sharks in British waters, which seem this year to have been invaded by this fish. On several occasions small boats have been attacked by mystery fish that have turned out to be basking sharks, which are usually regarded as harmless. In the last week in September one of these, said to have been 30 ft. long and estimated to weigh 10 tons, was hooked in the Firth of Clyde from a small dinghy, and towed the boat more than 100 miles.

Although our shores are for the most part free from dangerous sharks, some of these are found in certain areas not far distant. For instance, shoals of fierce blue sharks cause trouble to fishermen about 100 miles to the west of the Scilly Isles by attacking fish caught in the nets, often destroying a whole catch.

The basking shark is fairly common off the west coast of Ireland during the summer months. It is so named because of its habit of sunning itself on the surface. Next to the whale shark, which may reach a length of 70 ft., it is the largest living fish, often exceeding 40 ft. in length, with a weight of over 8,000 lb. It has a disconcerting habit of "breaching," that is of hurling its vast bulk clear out of the water, falling with a tremendous splash that can be heard for miles. A small boat near a breaching shark may easily be capsized.

Sharks have considerable commercial value, and factories for dealing with them have long been established in South Africa, Australia and America, and more recently in Norway. They are a valuable source of oil that can be used not only as a food, but also in the manufacture of paints. Their teeth can be made into ornaments, and their bones into fertilisers, and a method of tanning shark skin recently discovered yields a leather that is used in the production of fancy goods of all kinds.

A Valuable Egg

An accidental blow by a labourer's pick has caused a considerable amount of trouble to a New Zealand scientist, who for many months has been engaged in repairing the damage caused by it. The labourer, who was employed in quarrying, completely shattered a strange egg which was buried in the ground where he was at work. When the fragments were examined, they were identified as belonging to the moa, a bird that is now extinct.

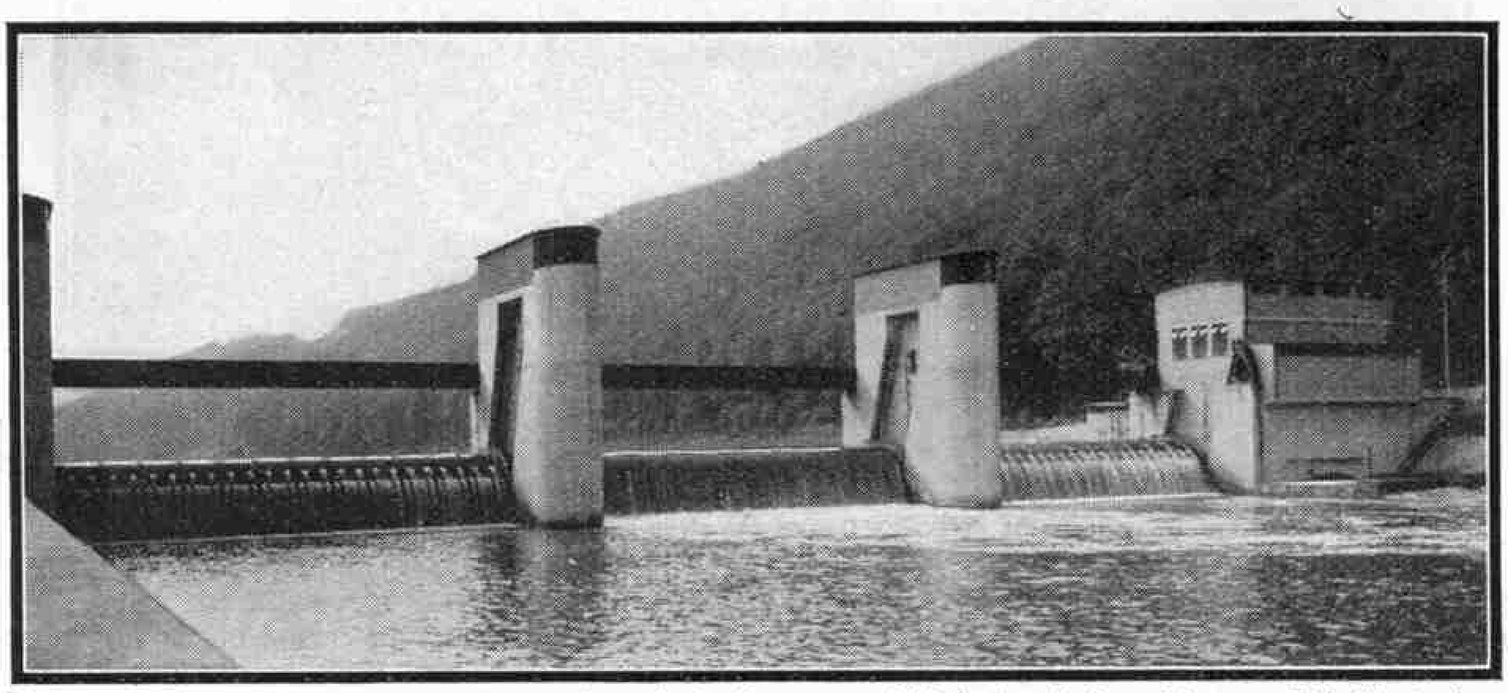
The moa was the largest bird ever known to have lived on the earth. Some specimens are said to have been as tall as a giraffe. It could not fly, for it had no wings, and it was hunted by Maoris until it was exterminated about the middle of the 18th century.

The same fate overtook many other birds that were without the power of flight. The great auk was once common in Northern Europe and in North America. Though swift and active in the water it was clumsy on land, and as it could neither fly nor run it was easily killed with clubs. It became extinct about 1840.

Regulating the Flow of a River

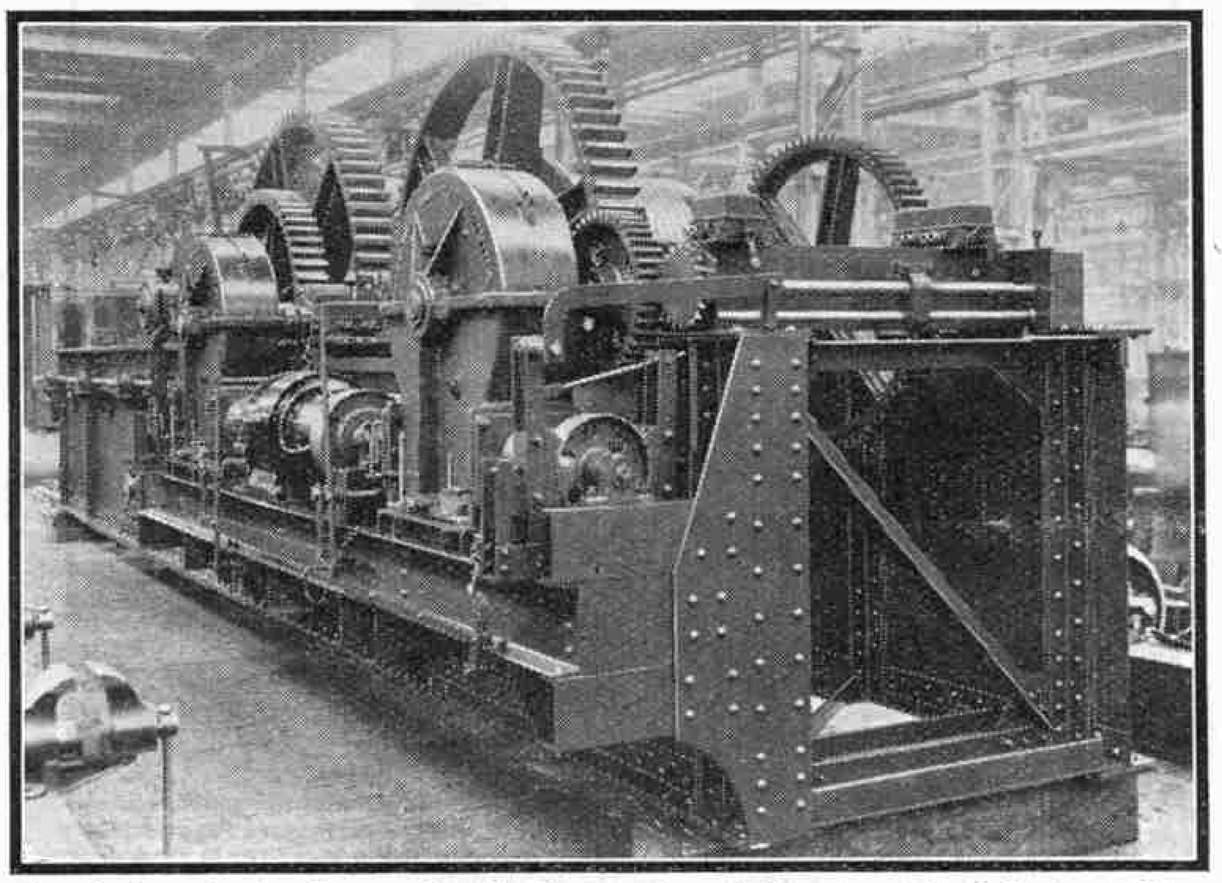
The Guttenbach Weir on the Neckar

THERE are many instances in which the level of a stream has to be regulated by means of a weir or similar contrivance. For example this may be necessary to prevent flooding, or for maintaining a level suitable for navigation. Another use of a weir is in hoarding supplies for irrigation purposes or for the production of hydro-electric power. In many parts of the world rainfall is unequally distributed in quantity throughout the year. The supply of water for any purpose can then be maintained only by storing it in some manner when it is plentiful, and doling it out in the dry season. Consequently the engineer has been compelled to exercise his ingenuity in impounding and regulating the flow of water in rivers and lakes. The usual plan is to erect a masonry barrier, such as a dam or weir, against the upper side of which the water accumulates until it reaches the required height. Any excess of water is permitted to escape, either through sluice gates provided or over the top of the dam itself.



The drum weir across the River Neckar, at Guttenbach, Germany, which is described on this page. This illustration and that below are reproduced by courtesy of John Rolland and Co. Ltd., London.

The manner in which a dam or weir is constructed depends on the conditions existing at the point where it is to be thrown across the river. There are many different types in use, and one of the latest and most interesting of these is one that has been erected across the River Neckar at Guttenbach in Germany. This weir was built to the plans of Fried. Krupp Grusonwerk A.G., Magdeburg, Germany, whose agents in this country are John Rolland and Co. Ltd., London.



The winch mechanism for operating the drums and regulating wing of the Guttenbach Weir.

There are several varieties of drum weirs, but the special feature of the Guttenbach weir, which is described as of the winged-drum type, is that the level of the water stored behind it can be set without raising the main body, or drum, of the weir itself. The weir is shown in the upper illustration on this page, and is designed so that the gates can be withdrawn from the water to allow the stream free passage, and to allow accumulations of drift wood and other debris to disperse. In the lower illustration can be seen the machinery by which the weir is operated.

The weir consists of three masonry piers, with openings 100 ft. in width between them. In each of these a steel drum is mounted. At each end of each drum is a pinion that engages with a rack fixed in the pier alongside it. A steel flat-linked chain is wound round the drum, and the other end of the chain is attached to the barrel of a winding winch, so that the drum is made to turn by operating the winch. The pinions at its ends then climb up the racks, thus raising the drum and freeing the opening for the discharge of the water.

The two outer openings of the weir are fitted with drums of the usual type. The winged drum that is the chief feature of the Guttenbach weir is in the middle. The wing attached to the drum is hinged, and it can be moved up or down to increase the effective height of the barrier and thus to regulate the level of the water without raising the drum from its lowest position. This wing is a steel flap 5 ft. in height, and is moved independently of the drum. When lowered it lies flush with the surface of the drum. In use it gives more accurate control over the water level.

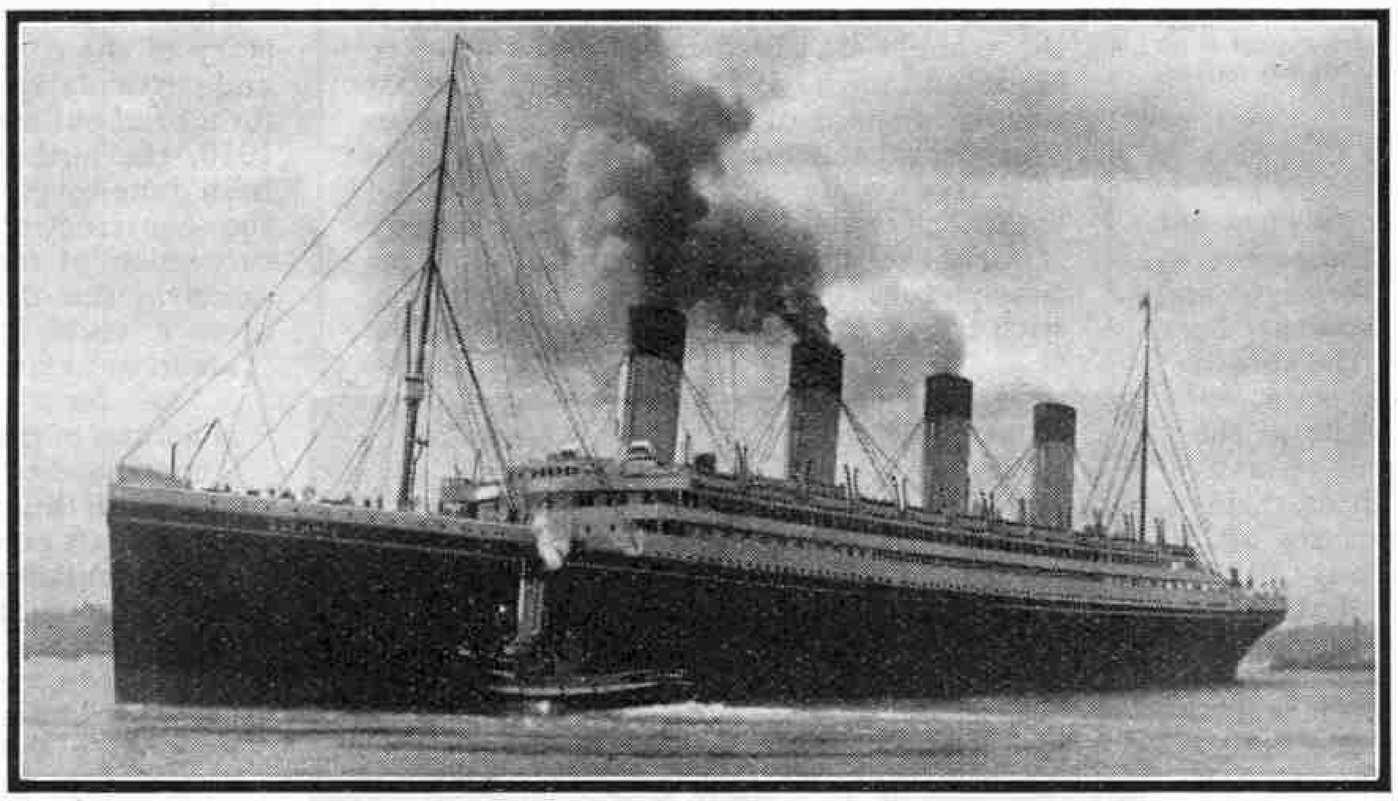
The plant includes two winches, one of which operates the drum itself, while the other controls the raising and lowering of the wing. Both winches are driven by the same motor, which can be coupled to either of them at will. The wing is operated by three wire ropes, two of which are employed for lifting and one for lowering. All three ropes are run from the rope drum over idler sheaves to a main sheave keyed to a hollow shaft that is in line with the axle of the drum.

This article is based on information given in the V.D.I., Berlin, Vol. 81, and "Engineering Progress," Berlin.

The "*Olympic's*" Last Voyage

Passing of a Famous Ocean Greyhound

THE passing of a famous Atlantic liner always arouses keen regrets. In recent years such well-known vessels as the "*Doric*," the "*Adriatic*," and even the "*Mauretania*," the wonder ship that held the Atlantic record for over 21 years, have passed into the hands of the ship-breaker. Now the Cunard White Star liner "*Olympic*" has suffered the same fate. Her long career in the North Atlantic Service began in 1911, and continued for 24 years, with the exception of a break during the Great War, when she became an armed transport. Altogether she made 257 round trips across the Atlantic Ocean, steaming about a million and a half miles, and throughout her service she was a great favourite with travellers from both sides of the ocean.



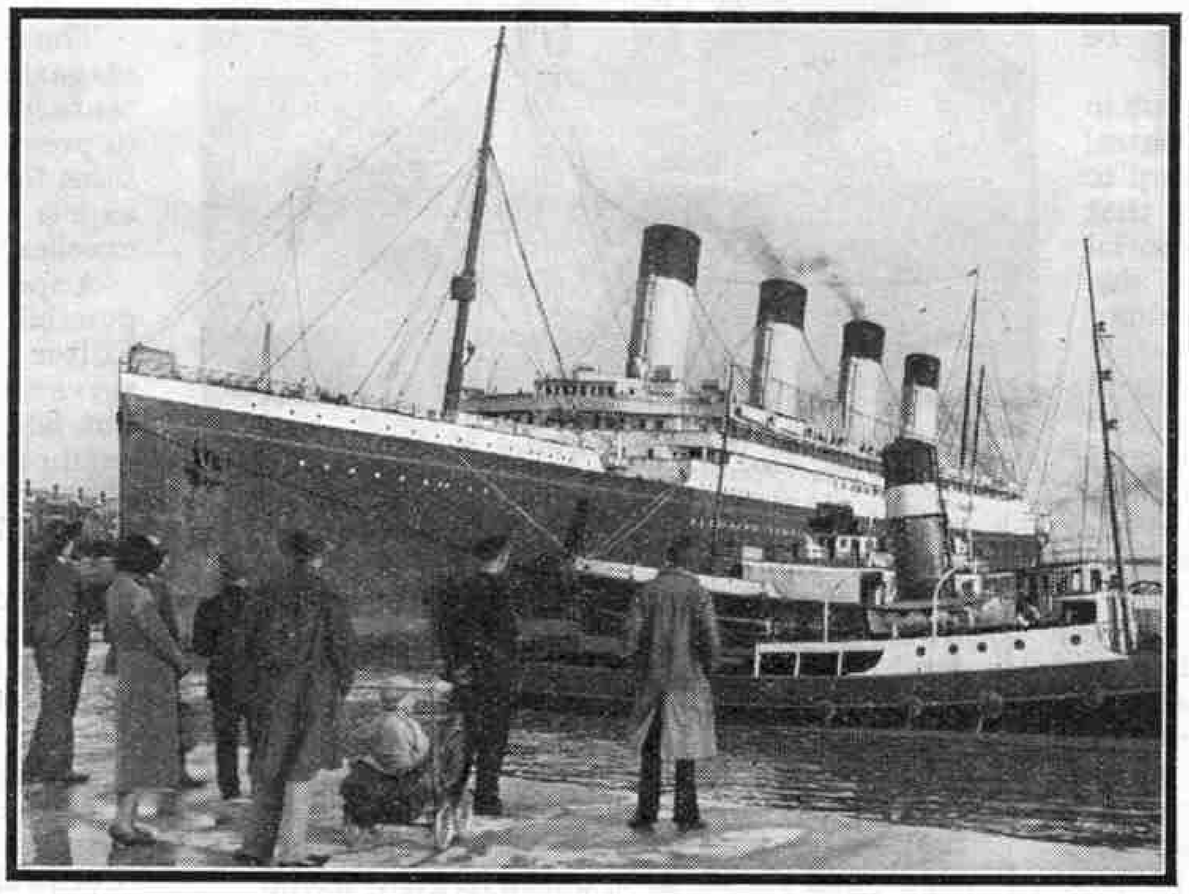
The Cunard White Star liner "Olympic" when in service. This famous vessel made 257 round voyages across the North Atlantic, steaming about a million and a half miles, during her career of 24 years. She was taken out of commission in April 1935 and is now being broken up.

The "*Olympic*" was built by Harland and Wolff Ltd., at Belfast. She was 882 ft. 9 in. in length and her gross tonnage was 46,439, making her the largest ship ever built at the time of her completion. Until the appearance of the "*Queen Mary*" she was the largest passenger vessel built in the United Kingdom, and even then she remained the world's largest triple-screw steamer.

With her four funnels and fine lines, the "*Olympic*" was a handsome vessel, and set a new standard by the luxury and comfort of her passenger accommodation. She had many features that had never previously been seen in Atlantic liners, among them a swimming pool and a squash rackets court. She left Southampton on her maiden voyage to New York on 14th June, 1911, and accomplished the crossing in 5 days 15 hr. 2 min. at an average speed of 21.43 knots. Her last voyage began on 5th April, 1935, when she turned her back on America for the last time on her way to Southampton.

The vessel had a wonderful War record as an armed transport. In this capacity she steamed over 184,000 miles, and carried more than 200,000 Canadian and American troops without a single casualty, although on several occasions she was attacked by submarines. In May 1918 she even succeeded in sinking one of these dreaded assailants, ramming it as it rose to the surface near her.

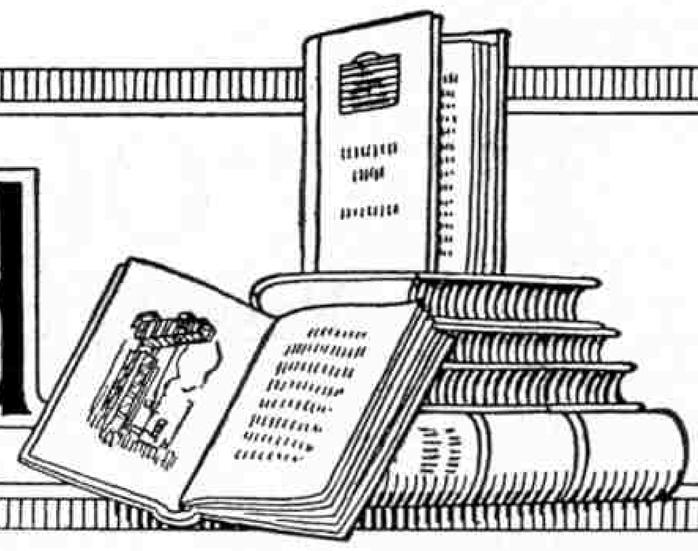
On her withdrawal from service in 1935 the "*Olympic*" was bought by Sir John Jarvis, M.P., for nearly £100,000 in order to provide work at Jarrow. There 100 men have been employed during the last two years in stripping her. She was too large to beach at Jarrow for her hull to be cut up, however, and for this purpose she was moved in September of this year to Inverkeithing, on the shore of the Firth of Forth.



The "Olympic" docking at Southampton after completing a transatlantic passage. The illustrations on this page are reproduced by courtesy of Cunard White Star Ltd., Liverpool.

Instead of steaming proudly along under her own power, the "*Olympic*," now little more than a hulk, was towed to the breaking-up yard. The trip was one of the most delicate towing feats of recent years. All traffic on the Tyne was stopped as the great hull was towed from her berth by six tugs, and started on her journey out to sea. There were eight tugs with her as she passed down the river, three ahead, three astern, and two in attendance. On reaching the open sea two sea-going Dutch tugs took charge of her, and later two others joined them in the task of towing the "*Olympic*" on her last voyage. This was much shorter than her regular passages across the North Atlantic Ocean, and she soon reached Inverkeithing where she was tied up for the last time. Now the great liner, once an ocean greyhound, is being broken up and reduced to scrap.

Books to Read



Here we review books of interest and of use to readers of the "M.M." We can supply copies of these books to readers who cannot obtain them through the usual channels. Order from Book Dept., Meccano Limited, Binns Road, Liverpool 13, adding 1/- for postage to the price. Postage on different books varies, but any balance remaining will be refunded.

"Wardens of the Wild"

By T. C. Bridges. (Harrap. 7/6 net)

Mr. Bridges' attractive book tells us what steps are now being taken to preserve as many as possible of the strange and wonderful creatures that have been threatened with extinction by the spread of civilisation. He has sought everywhere for information, and his accounts of the many great National Parks and reservations now set aside is full of interest, including tales of exciting adventures with wild animals and a wealth of out-of-the-way information about the habits of birds and beasts.

The opening chapters deal with Africa, which possesses the world's finest zoo in the Kruger National Park, in the Transvaal. Mr. Bridges tells us about the half million creatures that now inhabit this magnificent sanctuary of nearly 9,000 square miles of unspoiled Africa. Then follow wonderful stories of elephants, not only in Africa, but also in Ceylon, India, Burma and Malaya. In Asiatic countries the elephant is highly valued because of the intelligence and strength it displays when tamed and put to work, and even where wild elephants create havoc among plantations there is a decided feeling that these creatures should be protected.

One of the most interesting chapters in the book deals with the gorilla of Central Africa, a great ape that may weigh up to 400 lb., although its height is only that of a man. It is curious that the equatorial forests in which this creature lives also house the pygmy, the smallest human being.

There are vivid stories of National Parks and sanctuaries for buffalo and musk oxen in the United States and Canada, for the koala and opossum in Australia, and for other creatures elsewhere. We read of Grey Owl, who has created a beaver reserve in Canada; of "Jack" Miner, the founder of a sanctuary for wild birds near the Niagara Falls; of Charles Jones, a Shropshire man now living in British Columbia, whose bird friends are extraordinarily tame; and of T. P. Bellchambers, who did similar work in Australia. Bellchambers had an amazing influence on animals of all kinds, particularly birds, and on one occasion succeeded in setting the broken wing of an eagle.

Mr. Bridges devotes a special chapter at the end of his book to birds, which he describes as Man's best friend, and shows how they are now being more and more regarded as creatures that must be preserved rather than as game or merely something to shoot. The book is well illustrated by means of 32 full-page plates.

"Corporal Corey"

By Jack O'Brien. (Harrap. 5/- net)

Many wonderful stories have been told of the manner in which the Royal Canadian Mounted Police have kept order in the vast remoter regions of Canada, where at times every constable has to work on his own initiative while upholding the splendid traditions of the Force. Mr. O'Brien's story is full of exciting adventure, but at the same time pictures life in the Force as it really is, with the stern training and strict discipline that form the driving forces behind every action.

A picture taken in the bird sanctuary of Charles E. Jones, Vancouver. From "Wardens of the Wild," reviewed on this page.

Jim Bradley, the son of a wealthy mine-owner, is told by his father that he is too fond of easy living to make good, and on a sudden impulse decides to join the Canadian Mounted Police. We next find him in training at Regina, where he is given a hard time, particularly by the riding instructor. At first he becomes irritable under this treatment, and threatens to quit. His great friend Corporal Corey encourages him to stick to his guns, however, and a great chance comes when the police are called out to a riot in a mining village in the frozen North-West. Bradley distinguishes himself greatly. With Corey he joins in a stern chase after the leader of the rioters, who is captured and brought back in the face of stupendous difficulties. There is a coloured frontispiece and 12 full-page illustrations.

"Famous Aircraft"

By A. Coble and A. R. Payne. (Chambers. 6/- net)

Here is a book that tells the splendid story of the conquest of the air in a novel and particularly interesting manner. Except for a brief outline of progress up to the year 1910, the authors show readers what has been done by giving fascinating accounts of the construction and performance of a succession of famous aeroplanes, with an excellent line drawing of each. The result gives a vivid idea of the rapid progress made in aviation.

The book begins with outstanding machines of the War period, and the story is continued to the production of the most recent air liners and of the Mayo Composite craft now undergoing trials. Among the aeroplanes described are those in which the flights of Alcock and Brown, Lindbergh and others across the Atlantic were made, and the machines used by Polar explorers such as Wilkins, Byrd and Amundsen. Other famous machines dealt with include those in which record flights were made by Cobham, Scott, Jean Batten and others. The British seaplanes that won the Schneider Trophy outright are fully described, and bombers and fighting machines, commercial aircraft of all kinds, flying boats and airships also are included in the scheme.

"Sands, Clays and Minerals"

Edited by A. L. Curtis
(Vol. III, No. 2. 3/6 net)

The current issue of this valuable magazine contains 97 pages, and its contents fully maintain the high standard set in previous numbers. There are contributions for the general reader as well as the expert, and all are well illustrated by excellent photographs.

A special feature is made of the mineral possibilities of the British Empire. The Editor makes valuable suggestions for a survey in which not only Governments, but also statesmen, mineralogists and engineers would take part, and is confident that this would reveal resources that would make the Empire rich and self-contained. Some idea of this mineral wealth is indicated in articles on the possibilities in different parts of the Empire. One is concerned with Kenya, which may eventually yield supplies of gold and copper. Another deals in a similar manner with Uganda, which has great potentialities as a producer of copper and certain rare metals. A third is devoted to a survey of the mining industry of Cornwall.

The remaining contributions deal with such topics as beryllium and its alloys; little-known uses for borax and boracic acid; the preparation and marketing of coal, and various cements, clays and sands. Interesting articles give an account of the trade of the Port of Hull, describe the minerals of Southern Rhodesia, and sum up the progress that has been made in mining in Nova Scotia during 1936.

"The Evolution of Railways"

By CHARLES E. LEE, F.R.S.A., C.I.Mar.E. (The Railway Gazette. 2/6 net)

Mr. Lee's account of the evolution of railways is only 64 pages in length, but is a most important contribution to railway history. In it the author disposes of many misleading legends and stories about tram and plate ways, and the origin of the modern rail and the flanged wheel; and the information on a wide variety of railway topics that he has unearthed makes his book a fascinating one that should be read with keen interest by all railway enthusiasts.

The story of railways began much earlier than is generally realised, and the author actually traces the evolution of rail tracks from the system of roads in the Babylonian Empire about 3800 B.C. Certain later roads included two continuous parallel lines of stone blocks, and the use of this form of permanent way spread to the Greeks, whose tracks consisted of parallel stone rails with ruts or grooves to accommodate the wheels. Rutways were used by the Romans, and an example was unearthed in this country in 1901.

Narrow gauge mining railways with wooden rails seem to have been in use in Central Europe as early as the 12th century, and the author includes an illustration of a 16th century mining wagon with flanged wheels. It is difficult to fix the date of the adoption of rail tracks in this country but this seems to have been in the 16th century Gradual developments resulted in an extensive system of wagonways in coal-producing areas, especially in the North Eastern districts.

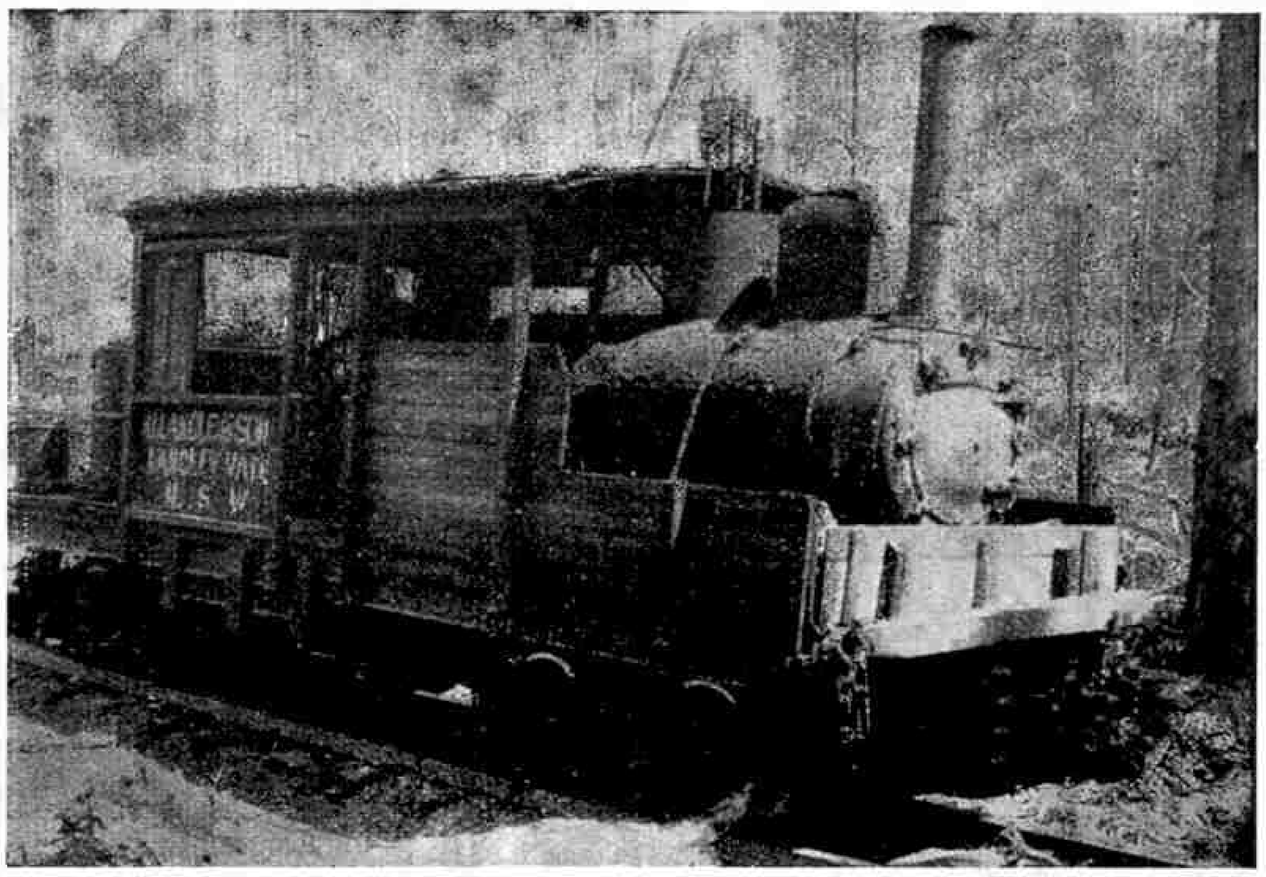
The sections dealing with the development of the tramroad, or plateway, are of special interest. It appears that this form of construction was not really a step in the development of permanent way, but was introduced in 1776 for the use of vehicles with flat tyres that had to travel partly on the ordinary road and partly on the tramroad.

The book is well illustrated by reproductions of photographs and drawings, most of which play important parts in the author's arguments.

"Locomotives of the Great Southern Railways of Ireland"

By S. J. W. (A. H. Stockwell. 3/6 net)

The author feels that the railways of Ireland have been poorly represented in recent railway literature, and has compiled this account of the locomotives of the Great Southern Railways of Ireland to assist travellers on that line to identify the locomotives that they see. He gives the leading dimensions of each class, together with interesting notes on special engines, and the book also contains useful information on gradients and haulage power. A summary and register of Great Southern Railway locomotives is given, and there are 34 illustrations of engines dealt with.



A locomotive that has been at work for 50 years in Australia. It runs on wooden rails. The illustrations on this page are from "The Evolution of Railways," reviewed on this page.

"A.C.E."

By S. P. B. MAIS. (The Southern Railway. 2/6)

The title of this book, "A.C.E.," is an abbreviation of *"Atlantic Coast Express,"* the popular S.R. express serving Devon and North Cornwall. The book describes in an entertaining manner what can be seen from this famous train, and its interest drives home the statement in the introduction that the best way of seeing England's countryside is from the window of a train. Mr. Mais gives his readers every possible help in looking out of the window with him, and there is a sense of real disappointment when the text comes to an end, with the striking observation that "the nearest land is in another hemisphere, three thousand miles away."

Quaint but fitting illustrations by Anna Zinkeisen add to the charm of the book, and the journey can be followed on a folding map of the route that has on it reproductions of photographs of places of interest to be seen. There is a striking cover design that conveys to readers in attractive form the invitation to "look out of the window."

A loaded coal tram of the type used in South Wales 125 years ago for transporting iron ore. It is now in the National Museum of Wales.

"The Modern Book of Engineering"

By W. H. MCCORMICK. (A. and C. Black. 5/- net)

Readers will welcome this splendid book on modern engineering triumphs by Mr. McCormick, Editor of the *"M.M."* It is a companion volume to *"The Modern Book of Aeroplanes"* and *"The Modern Book of Lighthouses, Lightships and Lifeboats,"* also by the Editor, published last year, and its purpose is to show the engineer designing, building and equipping his creations.

The first chapter deals with the construction of the steam locomotive, from the time when it is represented only by drawings, to its appearance in readiness for trials on the road. The building of a motor car by the latest mass production methods follows, after which we come to the story of a great ship, first to the time when it is launched, and then to its fitting out and completion for its work at sea.

Tunnels form the subjects of the next three chapters. The first deals with mountain tunnels, and explains how powerful drills and explosives are used to break up the rock. This method also is used for underwater tunnels when these pass through rock, but those driven through the clay or mud of river beds are constructed with the aid of shields, and compressed air keeps water out of the workings. A special description is given of the construction in this manner of the Holland Tunnel at New York, the first great underwater tube designed for motor traffic. The following chapter is devoted to the even larger road tunnel under the Mersey that was opened in 1934.

Mr. McCormick then turns to canals, the story of which forms a wonderful chapter in engineering work. He begins with the story of Brindley and the famous canals that he constructed in England, and passes on to the building of the Manchester Ship Canal and the creation of the Suez and Panama Canals, the world's most famous waterways. The wonders of these great canals are well described, and the dramatic events that led to their completion are vividly recounted. The Welland Ship Canal, the great Canadian waterway connecting Lake Erie with Lake Ontario, is their only recent rival as an engineering marvel, and a special section of the book is devoted to its construction.

Bridges of various types are dealt with in the remaining chapters. The reader is given full and accurate descriptions of the greatest structures of this kind, from Telford's suspension bridge across the Menai Straits to the Forth Bridge, the Sydney Harbour Bridge, and the recently completed Golden Gate and San Francisco-Oakland Bridges in the United States. Famous examples of bridges that travel, open, lift and swing also are described.

The illustrations are of unusual interest. There are 16 photogravure full page plates, reproducing 25 photographs of engineering works or operations. D. G.

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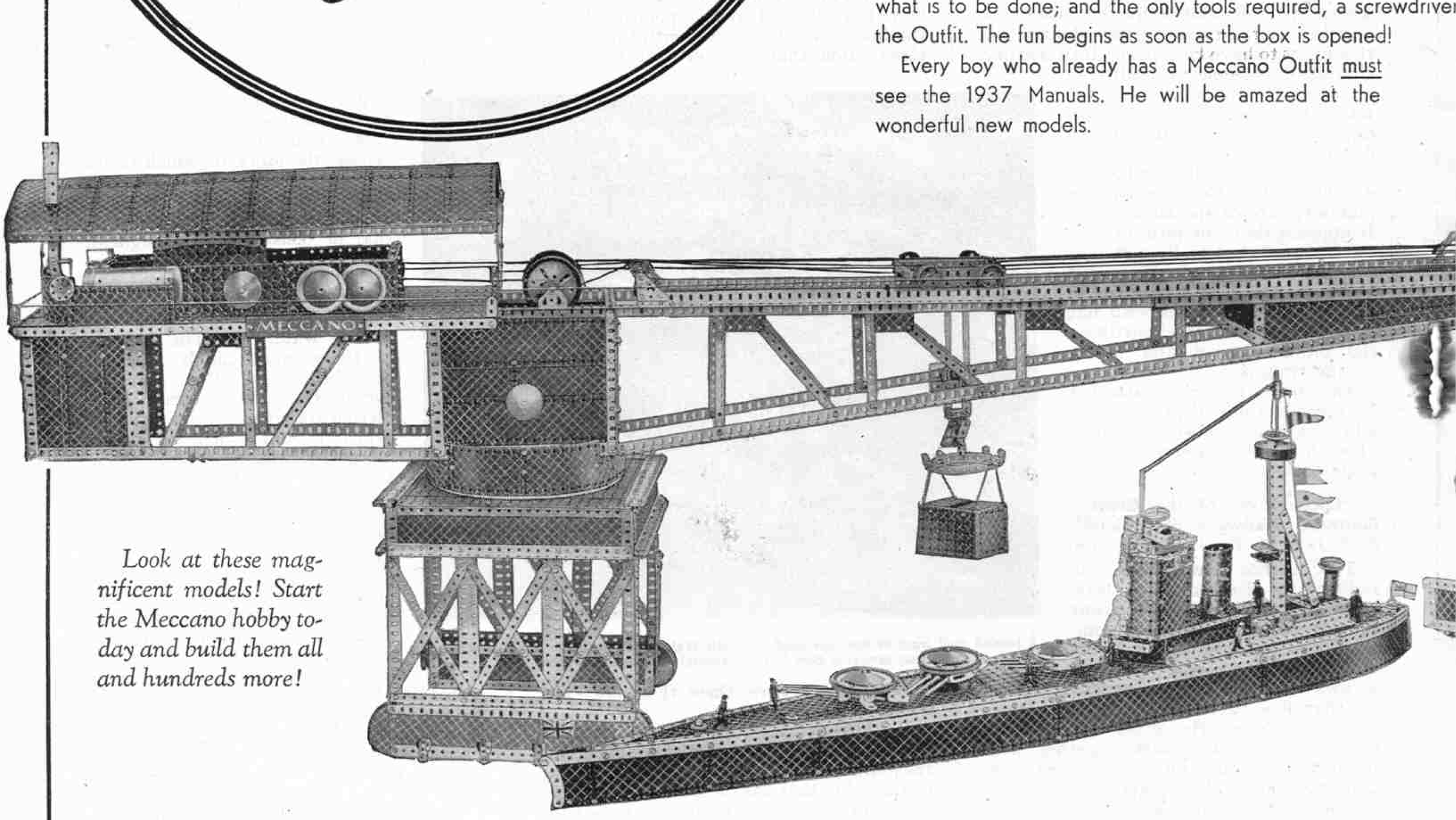

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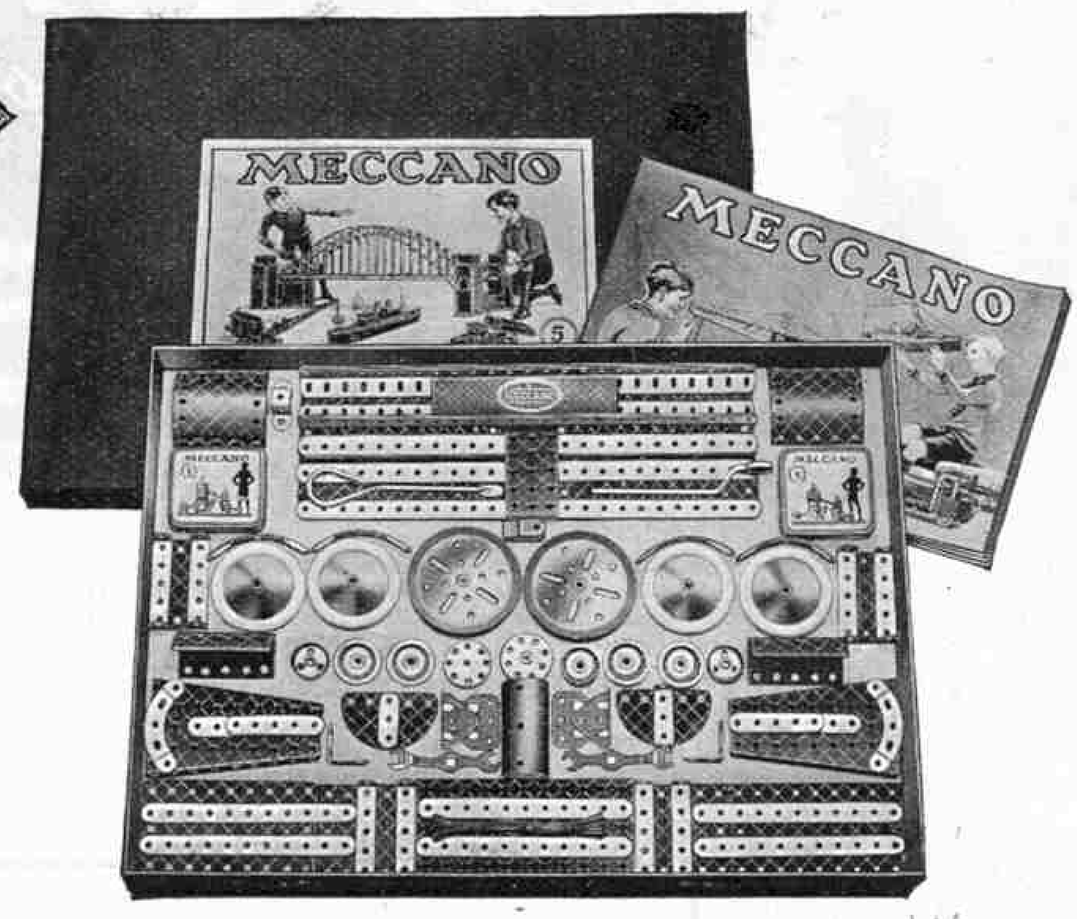

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No. 1 „	3	6	No. 7 „	30	0
No. 2 „	5	0	No. 8 „	55	0
No. 3 „	7	6	No. 9c „	80	0
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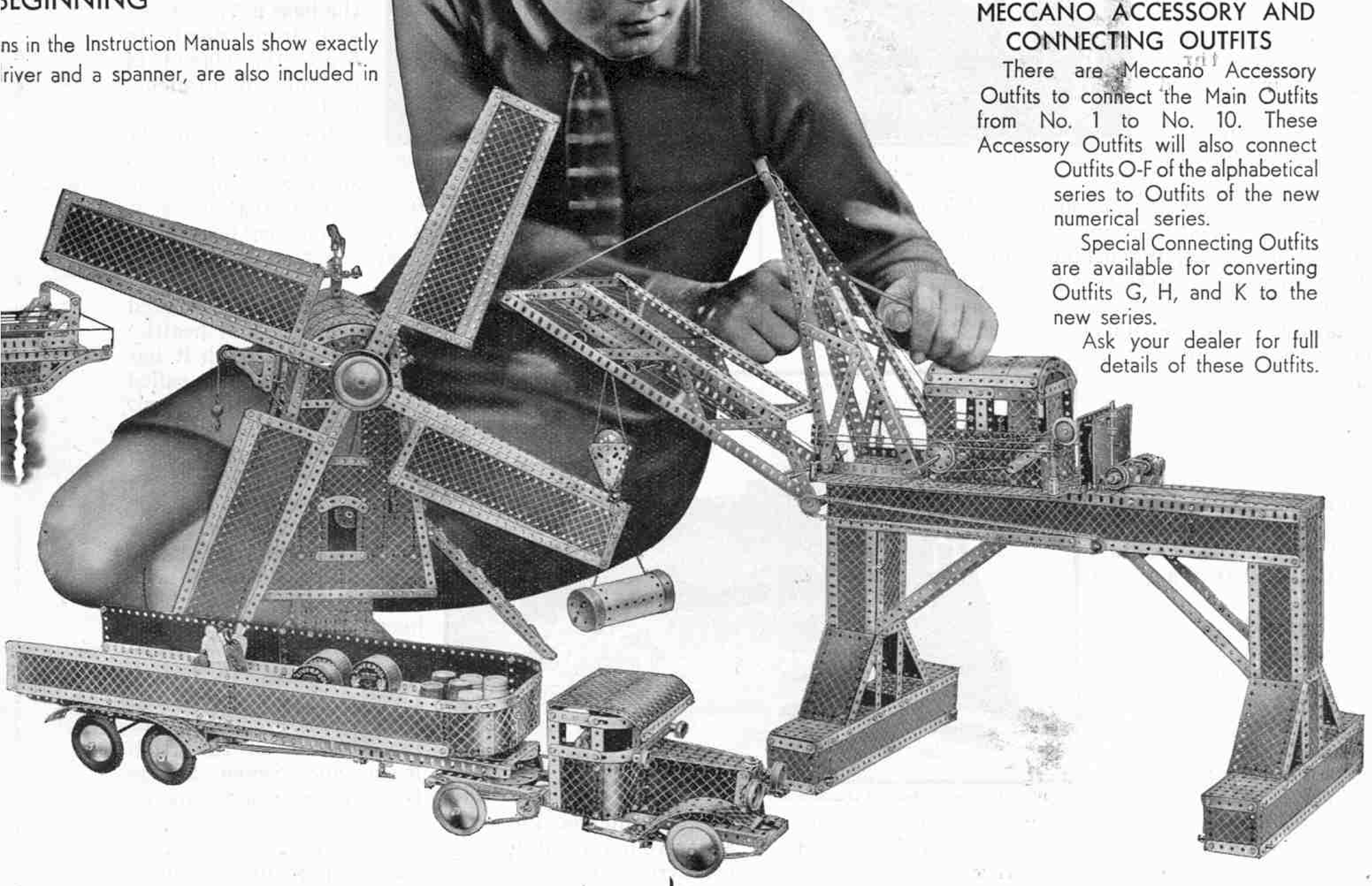


These pages are reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

A Visit to the Outer Hebrides

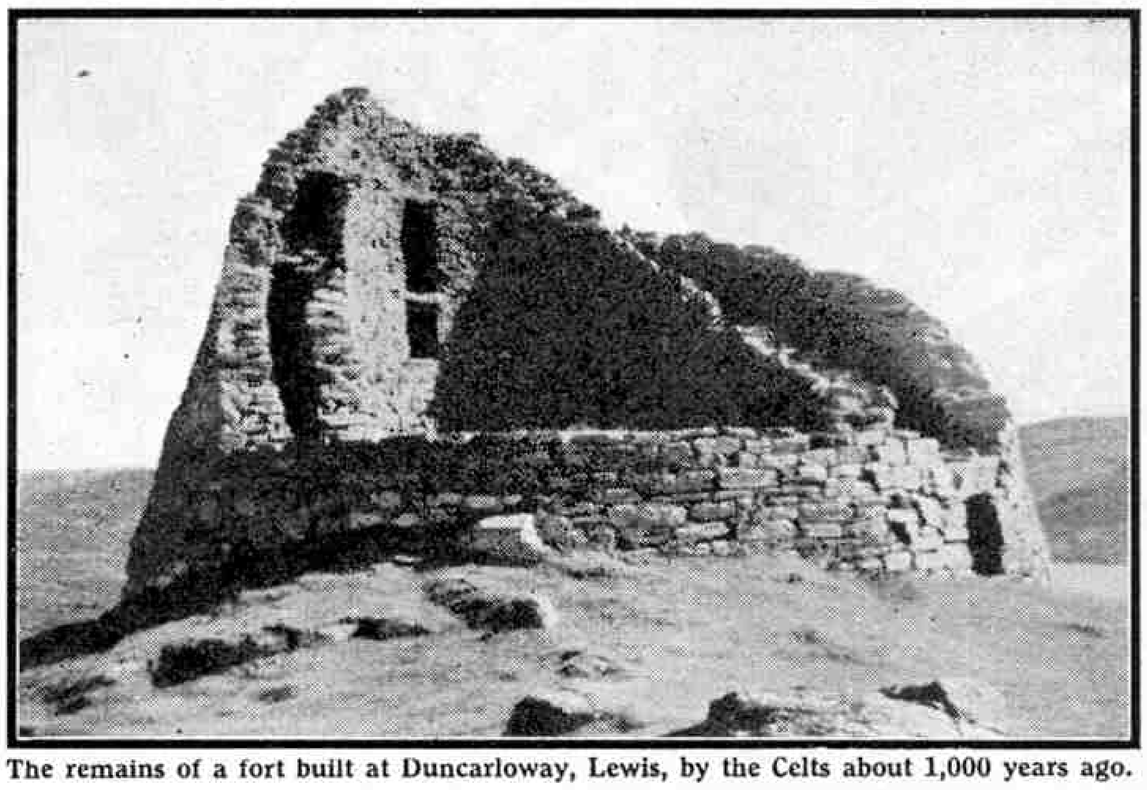
Recently I made the trip by sea from Kyle of Lochalsh to Lewis, in the Outer Hebrides. I went in the "*Lochness*," a fine twin-screw steamer built in 1929. We steamed northward, made a call at Applecross, on the mainland, and then turned seaward across the Minch and headed for Stornaway, 50 miles to the northwest. We passed round the northern coasts of Skye and Rona, and after about three hours' sailing sighted Lewis.

We tied up at Stornaway in the early evening. The town is a fine modern one with a population of just over 4,000. It has an excellent harbour, which has enabled it to become a great herring fishing centre.

There are many interesting relics of ancient times to be seen in Lewis, and at Callernish, some 16 miles from Stornaway, I saw the ruins of what is thought to have been a temple erected to the Sun. It is the most complete and imposing ruin of its kind in the West of Scotland, and consists of a circle of stone pillars surrounding a monolith 17 ft. high. Other stones are so placed that the general formation is that of a giant cross.

The imposing ruin of an ancient temple at Callernish, Lewis, in the Outer Hebrides. The photographs on this page are by R. J. Robertson, Balerno.

At Duncarloway stands the remains of a fort built by the Celts about 900 A.D. This building was used by the Celts as a refuge when attacked by the Norsemen. They drove their cattle into the inner circle of the fort, and the people themselves remained in the narrow space between the outer and inner walls. I managed to get inside here, and was astonished to find so little room that I could scarcely turn round. Yet refugees sometimes lived there for three weeks. R. J. ROBERTSON (Balerno).



The remains of a fort built at Duncarloway, Lewis, by the Celts about 1,000 years ago.

Interesting Trees in North London

There are several famous trees in North London, the best known probably being the Minchenden Oak. This is a mighty tree standing in the Minchenden Garden of Rest. It is said to be well over 800 years old, and is a remnant of the ancient forest of Middlesex. Mention of it is made in the Doomsday Book. The girth of the tree at the base is 27 ft. 6 in., and from north to south the spread of its limbs and branches is 136 ft.

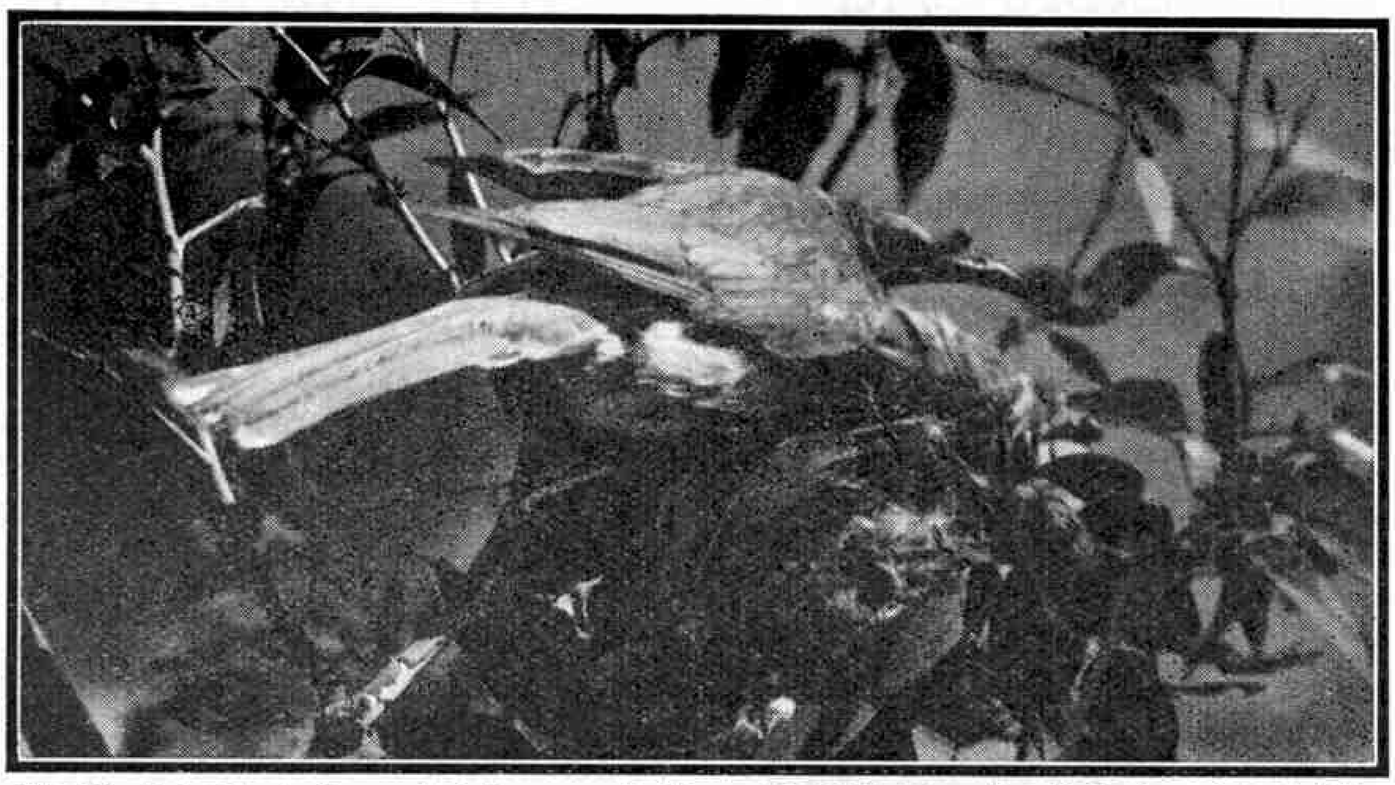
Not far from the celebrated oak stands an interesting black cherry tree, planted only 50 years ago, that leans at an angle of about 45 degrees. Its trunk has been filled with concrete, but it still bears fruit in spite of its solid interior.

At East Finchley is an oak traditionally associated with Dick Turpin. This is a fine old tree, still healthy and green, although it has lost its head. It is called Turpin's Oak, as the famous highwayman is supposed to have hidden in it when fleeing from the Bow Street runners after one of the daring escapades that have made his name so notorious. Bullets alleged to have been fired at highwaymen have been extracted from the trunk.

Other trees in North London have interesting associations. For instance, at the junction of the High Road and Seven Sisters Road there formerly stood a group of elm trees known as "The Seven Sisters," forming a ring round a walnut tree. The story is that their name was derived from the fact that they were planted by seven sisters. The original trees were replaced about the middle of the last century. R. EDMINSON (London).

A Strange Australian Bird

Many Australian birds are named after the sounds of their calls. For instance, there is the common cuckoo with its well-known cry. Then there is the plaintive peewit, and the curious bird named after its greedy cry of "more pork, more pork." Another has earned the name of "whip bird," while the laughing jackass derives its name from its frequent fits of what seems to be uproarious laughter.



The friar bird of Australia, popularly known as the "four o'clock" bird from its call. Photograph by K. Allen, Oatley, New South Wales.

Strangest of all these feathered creatures, however, is the bird popularly known as the "four o'clock." It is also called the "poor soldier," the "monk" and the "leather-head," these names apparently referring to its appearance; but its correct name is the friar bird. It does not present a pretty sight, as the upper illustration on this page shows. Its long beak with a large lump in the centre indeed gives it a decidedly ugly look. The crown of the bird is bare, which explains its name, and the growth of chocolate-brown feathers commences about half-way down the neck. It possesses very strong wings and claws, and can move swiftly, both through the air and over the ground. It is not unusual to see it hanging head downward from a branch of a tree, apparently trying to imitate a flying fox. The friar bird is an inveterate pilferer.

K. Allen (Oatley, N.S.W.).

In Harbour at Colombo

On a recent voyage to England from New Zealand, it was a welcome change to reach Colombo, the capital of Ceylon, and to see land and scenery again; for since leaving Fremantle in Western Australia, nine days previously, we had seen nothing but water. About an hour before we entered the harbour we passed several catamarans, or native fishing boats, going seaward to their fishing grounds. They looked very picturesque when seen against the palm-fringed shores in the early morning sunshine.

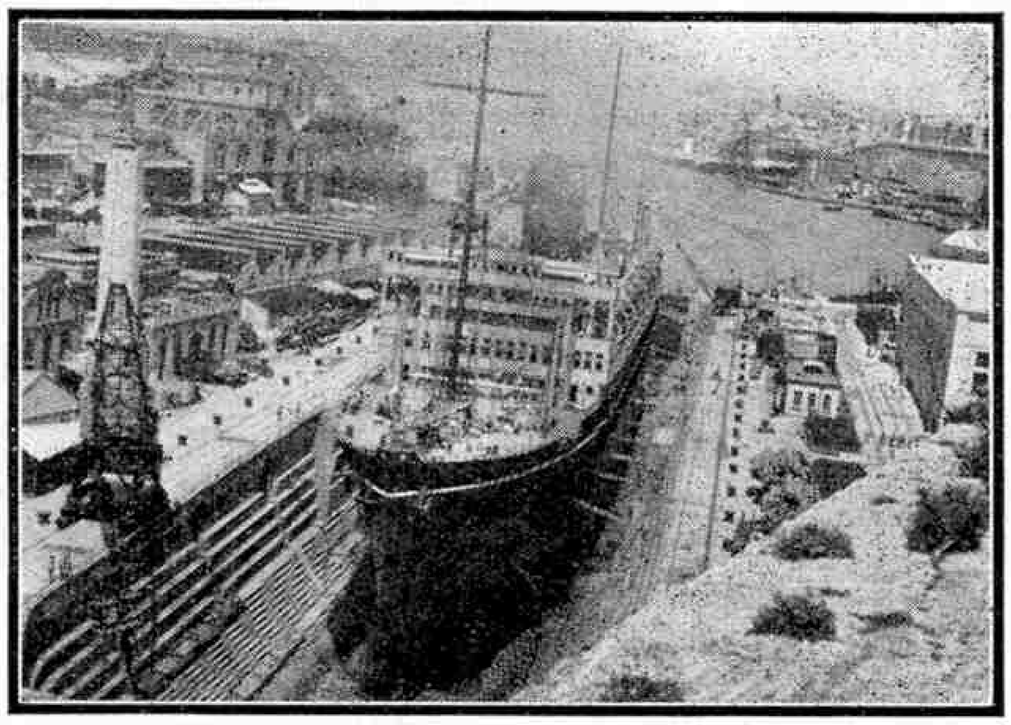
At about 8 a.m. our ship tied up to buoys in Colombo Harbour. Already 18 other ocean-going vessels were at anchor, including two British warships, "*Kent*" and "*Enterprise*." The harbour was alive with traffic, fussy little tugs and passenger launches dashing to and fro. On these were dozens of coolies, nearly all stripped to the waist and wearing skirts that reached to the ground. When working, these coolies just tuck their skirts in their belts in order to give their limbs more freedom of movement.

E. R. Sweet (Banbury).

The "*Viceroy of India*" at Malta

Some months ago it was found desirable to dock the Peninsular and Oriental liner "*Viceroy of India*" for slight repairs to the rudder and several other parts of the vessel. She was therefore taken to Malta, the nearest port where the necessary docking facilities were available. No. 4 Dock in the Admiralty Dockyard was used for the work. The liner was towed by two Admiralty tugs to the dock gates, which were swung open, and hawsers were carried from the ship and fastened to capstans at the sides of the gates. The capstans were then set in motion, and the ship began to move into the dock. As her stem slowly passed the capstans, the hawsers were transferred to other capstans further along the dock wall, and these pulled the ship far enough inside to allow the gates to be closed.

Meanwhile wooden beams of various lengths had been prepared to hold the ship rigidly in the middle of the dock. Ropes hanging down the ship's sides were tied to the ends of the beams to keep them touching the hull at the waterline. The pumps commenced emptying the dock and after a few minutes the ship's keel grounded on the bottom. The pumps were slowed and dock-hands in small punts took charge of the free ends of the beams, fitting them temporarily against the dock side by means of wedges.



"Viceroy of India" in dry dock at Malta. Photograph by J. M. Demanuele, Malta.

The water continued to run out slowly, and the beams took more weight as the ship settled down. Finally at a signal given by the dock-master, all the wedges were struck into position at exactly the same time by means of heavy sledge-hammers. The ship was thus securely held in place. The remaining water was then pumped out, and the repair work on the ship was commenced.

The refloating of the vessel after the necessary repairs had been carried out was much easier than the docking. The dock had only to be filled until the ship was in a sufficient depth to be able to float, when the two Admiralty tugs pulled her out again into the harbour. She then resumed her voyage to England.

The "*Viceroy of India*" is a fine twin-screw vessel of 19,700 tons built by Alexander Stephens and Co. Ltd., and completed in 1929. She is fitted with turbo-electric propelling machinery, and at the time of her completion was the largest vessel of her type in the world.

J. M. Demanuele (Malta).

In Search of New Models

Excavators and Trenching Machines

AMONG the most useful machines that the modern engineer has at his disposal are the many varieties of excavators and trench digging machines. These "machines for digging holes," as they may be called, are made in a variety of types and sizes, and provide the Meccano model-builder with splendid subjects. In addition to the pleasure obtained in building the model, there is the thrill of setting it in motion and of seeing it carry out all the movements of its powerful prototype.

Many different kinds of excavators and trench digging machines have been illustrated and described from time to time in the "*M.M.*" so that readers should have no difficulty in finding suitable illustrations on which to base their models. One of the best known types of excavators is the mechanical shovel. Most model-builders will have seen one of these machines in action, levelling hilly ground or digging large pits for the foundations of buildings. It has a large bucket shovel mounted on the end of a stout steel arm or dipper stick, that in turn is connected with a jib by two long racks meshing with gear wheels driven by a steam engine, or an electric motor. The bucket arm can be racked in or out as desired, thus varying the working radius. A wire rope fastened to the bucket passes over a pulley at the top of the jib, and then is attached to a winding drum. The result of this arrangement is that as soon as the gear clutch is engaged, the drum winds in the rope and the bucket is pulled upward. As the superstructure has a swivelling movement, a considerable area can be excavated without the necessity of altering the position of the base of the machine.

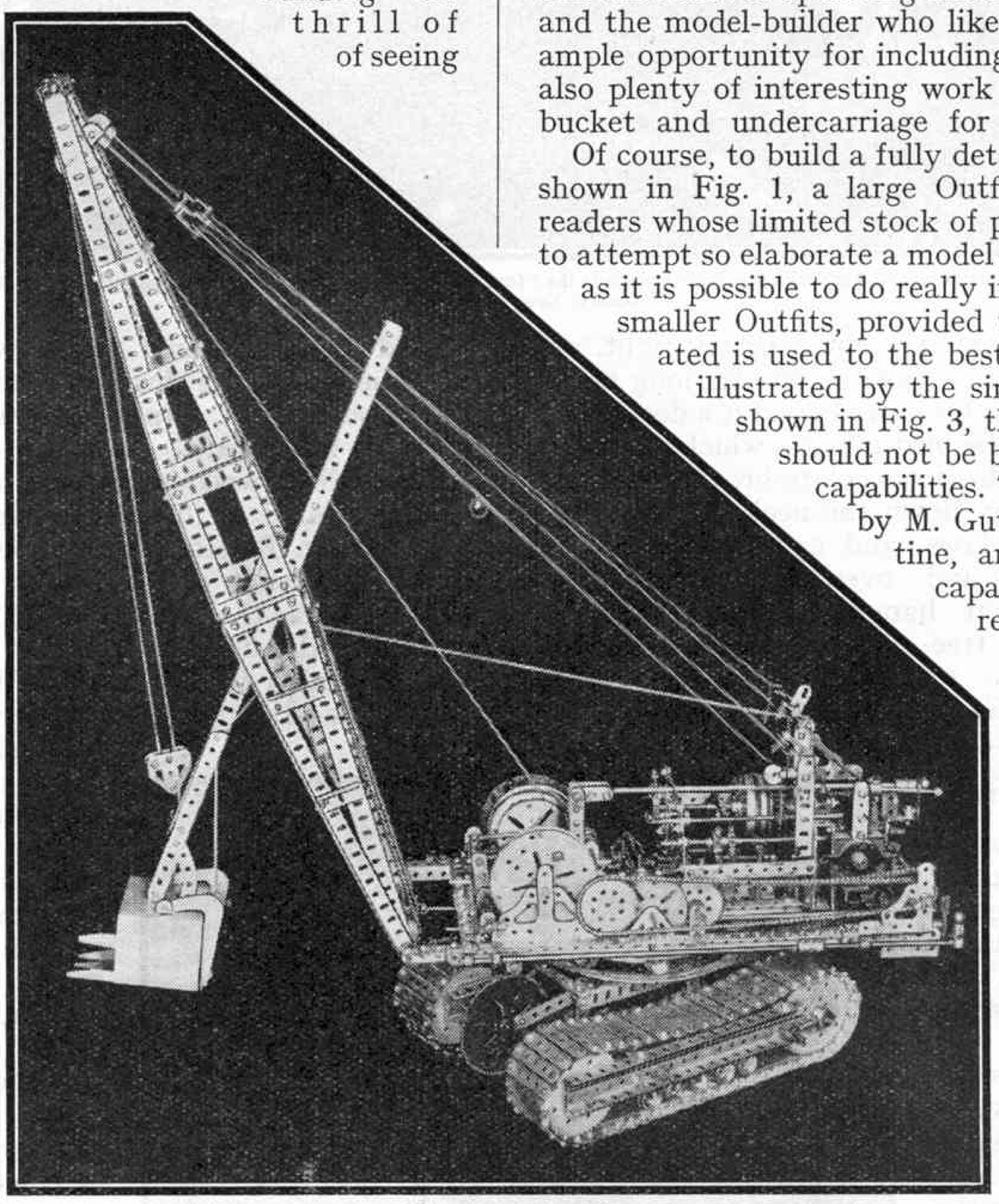


Fig. 1. This model of an electric shovel is the work of J. Willems, Antwerp, Belgium. It is operated by an Electric Motor, which drives 10 separate movements through a well-designed gear-box.

The leading edge of the digger bucket is fitted with a cutting lip armed with a number of teeth that dig their way into the material to be removed. In most machines, the jib is attached to a swivelling framework, in which the gears and power unit are housed. The whole revolving superstructure is mounted on an undercarriage, and this runs on rails, the travelling motion being taken from the main engines or motor.

A mechanical shovel of this kind possesses many features that make it a good subject for a model. There are, for example, many different ways in which the gear-box and shovel operating mechanism can be arranged, and the model-builder who likes experimenting is given ample opportunity for including original ideas. There is also plenty of interesting work in designing an efficient bucket and undercarriage for the machine.

Of course, to build a fully detailed model, such as that shown in Fig. 1, a large Outfit will be required, but readers whose limited stock of parts will not allow them to attempt so elaborate a model need not be discouraged, as it is possible to do really interesting work with the smaller Outfits, provided that each part incorporated is used to the best advantage. This fact is illustrated by the simple but realistic model shown in Fig. 3, the construction of which should not be beyond even a beginner's capabilities. This model was designed by M. Gutierrez, Martinez, Argentine, and although small it is capable of working in a realistic manner. A miniature boiler is made with a Sleeve Piece fitted with a Chimney Adaptor, and the engine cylinder is formed with a Coupling. The superstructure of the model can be swivelled and the dipper stick is operated by turning separate Rods.

For driving a small model of this type there is no more suitable power unit than a *Magic* Motor, and with one of these and a few gears it is quite easy to arrange a simple yet practical mechanism that will carry out all the essential movements.

A mechanical shovel that can be used also as a rock breaking machine has been introduced in America. This machine is similar in action to that already described, but the bucket can be replaced by heavy hammer-shaped weights. The dipper stick is pivoted at its upper end instead of its centre, in such a manner that it can be raised and then dropped quickly, so that the weights hit the rock to be broken with great force.

In a model machine of this type the hammer can be represented by two Boiler Ends fastened together by a Screwed Rod and Nuts to form a drum. If desired, the drum could be loaded with bits of stone or rock to

give it additional weight so that it will fall quickly.

An excavator that differs considerably from the mechanical shovel, yet possesses equal interest to the model-builder, is the dragline. The name "dragline" is derived from the fact that the digging bucket is suspended from the end of a very long jib and is dragged along the ground towards the machine by a flexible rope, instead of being attached to a dipper stick as in the case of the mechanical shovel. While mechanical shovels excavate above the level of the ground on which they stand and advance into the excavation as the work proceeds, a dragline excavates below the level on which it stands, and travels backwards when it has excavated all the material within reach. Some draglines are mounted on creeper tracks so as to make them suitable for working on soft or marshy ground. For a small model the tracks can be represented by Sprocket Chain, but when they are required for a large model the best plan is to construct segmented tracks from Strips bolted to endless lengths of Chain.

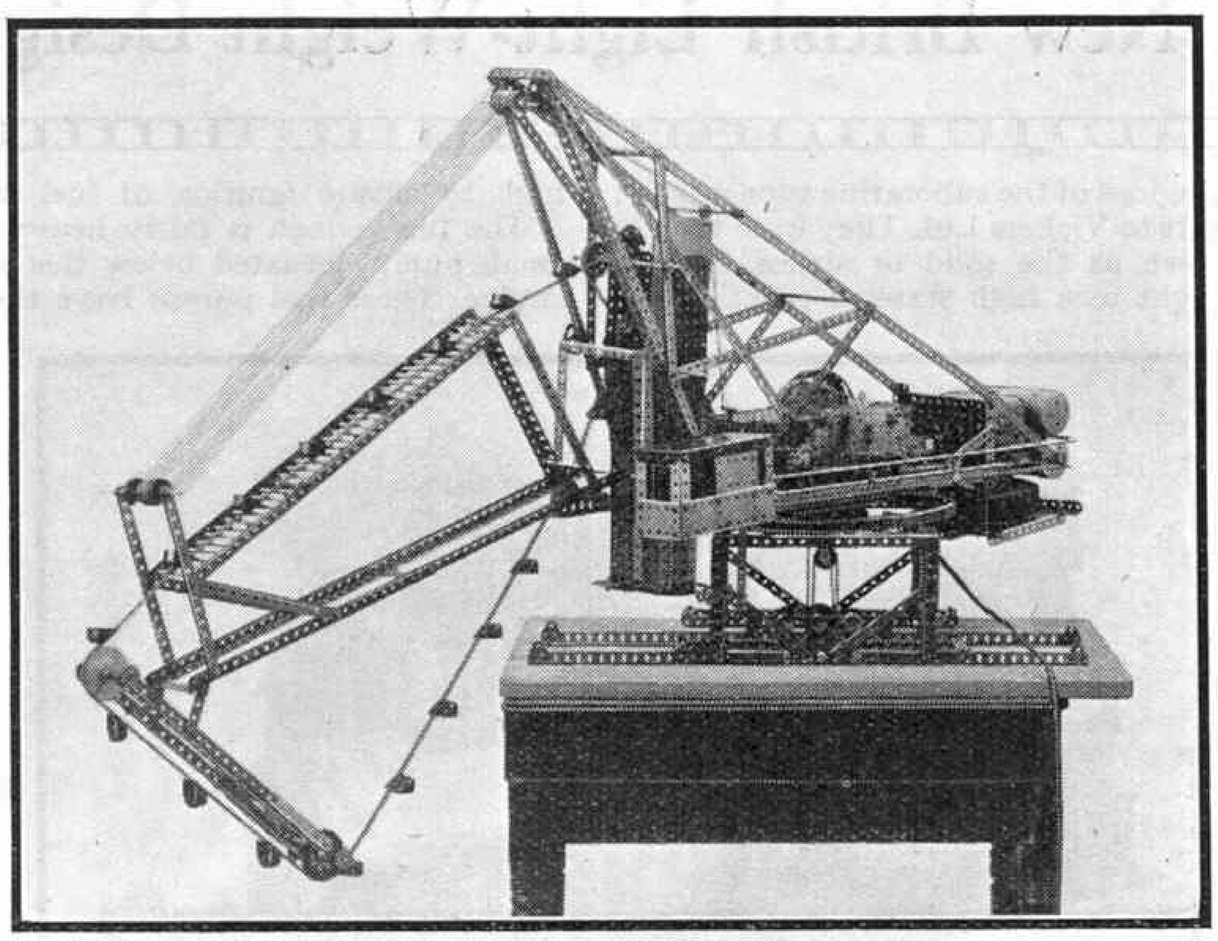


Fig. 2. A good example of a multi-bucket excavator built in Meccano. It was constructed by R. Campbell, London, S.W.16.

Another method of making creepers is shown in the model illustrated in Fig. 1. In these the segments or treads are represented by short Strips, which are bolted to belts of canvas. The canvas passes round driving wheels formed by 3" Sprockets, the drive being transmitted by the teeth of the Sprockets biting into the canvas. A tensioning device is fitted to take up any slackness in the belts.

A dragline must be strongly built. This applies particularly to such parts as the base and jib, which are subjected to heavy loads. In large models as much use as possible therefore should be made of Angle Girders. They can be bolted together to form T or channel section girders, and if skilfully arranged will give all the rigidness and strength required. There should be no difficulty in devising a roller bearing support for the swivelling superstructure, but it is advisable to see that there is no rocking movement, otherwise the model will not work smoothly and steadily. The arrangement of the mechanism for hauling the drag bucket backward and forward may be planned on similar lines to Suggestion No. 363, described on page 591 of the October 1936 "*M.M.*"

Another form of dragline used for working on marshes is a giant machine that "walks" with the aid of two great "feet," which are operated through a very powerful reduction drive. When the dragline reaches the site on which it is to work, the feet are raised and the dragline rests on its large circular base. This machine was illustrated and described on page 192 of the March 1937 "*M.M.*," and reproducing it in Meccano would prove an absorbing task, for there is ample opportunity for the enthusiast to display his model-building skill. The walking mechanism alone will supply a knotty problem to work out during the winter evenings!

Owners of large Outfits will find ample opportunity to test their model-building skill in modelling an excavator of the multi-bucket type, a fine model of which is shown in Fig. 2. These machines are used for constructing canals and widening and deepening rivers, and run on rails laid on the banks, the excavated material being discharged into trucks waiting alongside. The buckets travel along an arm that can be arranged at the angle necessary to produce the desired contour in the sides of the canal or river, and which can be raised or lowered as required as the work proceeds.

The Meccano Dredger Buckets can be used to good advantage in a machine of this kind, but where smaller buckets are required, they can be made with two Double Brackets bolted together to form a box. These can be attached to Sprocket Chain with short lengths of wire.

Other interesting excavating appliances that make excellent subjects for models are the various types of trench digging machines that are used for cutting trenches for pipe lines. Some of these machines are capable of digging trenches 6 ft. deep and 2 ft. wide at the rate of a mile a day. Usually they are in the form of a tractor fitted with creeper tracks, between which is a boom that supports an endless chain of buckets. The bucket chain is set in motion by the power unit, and as the buckets pass around the lower end of the boom they dig into the ground. Then they travel upwards with their load of spoil, and as they pass over the upper end of the boom the material is discharged on to a conveyor that deposits it at the side of the trench. Means are provided for raising and lowering the boom so that the depth of cut can be adjusted as required.

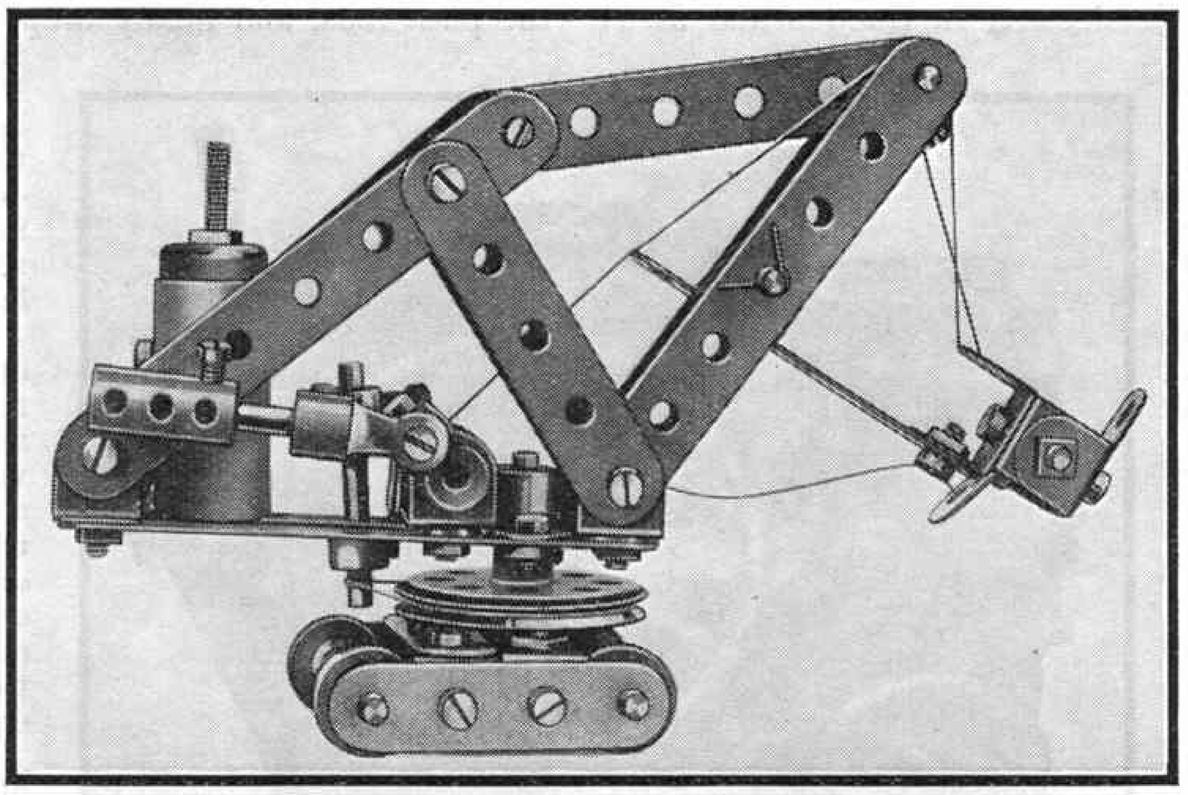


Fig. 3. This illustration of a simple model steam excavator shows the good work that can be done in this direction by owners of even small Outfits. The model was built by M. Gutierrez, Martinez.

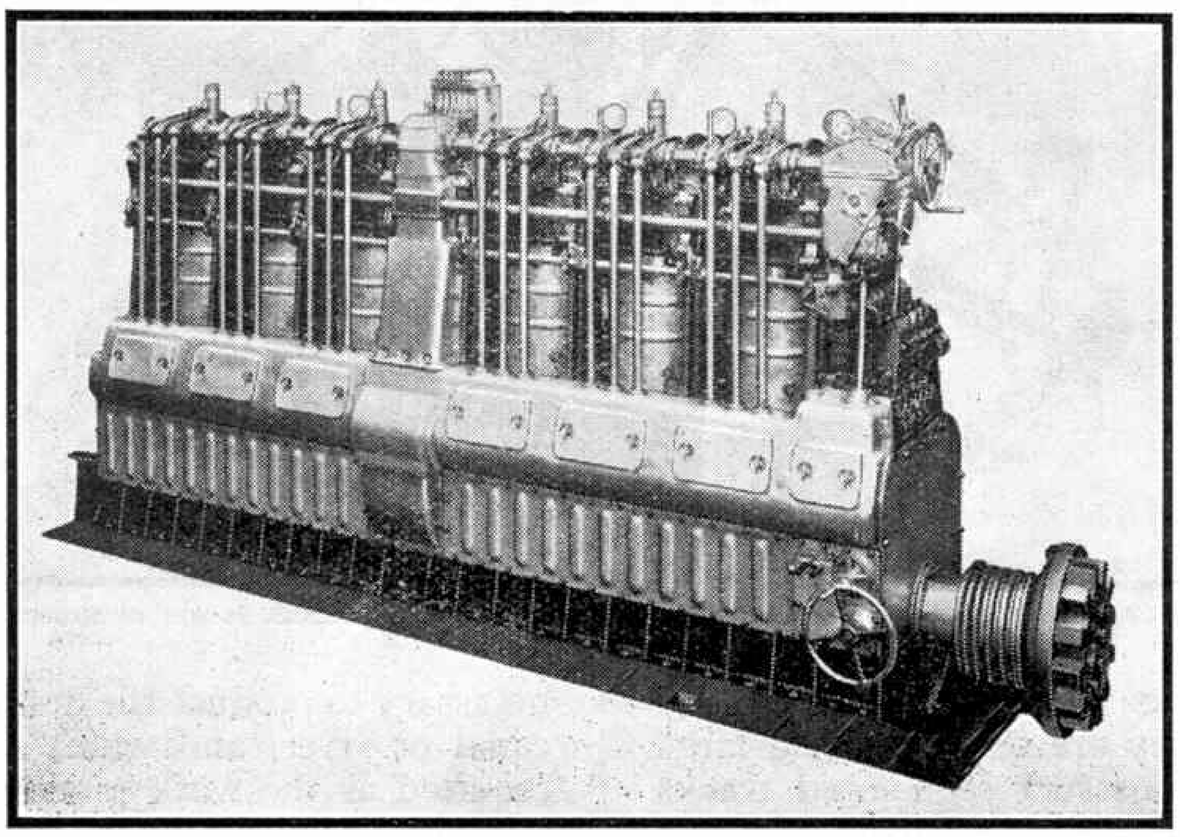
The conveyor belt is driven at a higher speed than the buckets, and in a model can be made from a strip of canvas or corrugated cardboard. If sufficient parts are not available to make proper creeper tracks, it is a good plan to use straked wheels built up with Flexible Plates.

Oil Engines for Submarines

A New British Light-Weight Design

THE development of British oil engines of the submarine type was due in the early days of such craft to Vickers Ltd. They were the original inventors of what is known as the solid or airless fuel injection system, which they brought to a high state of practical development. At the end of the Great War the engines of British submarines, with the exception of a few experimental installations, were exclusively of Vickers' design, all using solid injection.

Before going further it will be well to explain the meaning of "solid injection." In the oil engines originally designed by Rudolph Diesel, whose first English patent was dated 1892, the fuel was injected by a high-pressure air blast, and this system is still in use. In many modern engines, however, it has been replaced by what is known as the airless or solid injection system, in which the fuel is pumped into the cylinders under high pressure through injection nozzles. During the War the Admiralty Engineering Laboratory was set up, and among its first tasks was experimental work on an engine of the Vickers type. Late in 1920, with the concurrence of the firm, a large proportion of the results obtained was made public, convincing oil engine designers that solid injection was an established fact. From about that time may be dated the beginning of a world-wide development of this system, leading to its ultimate adoption by almost every maker of oil engines. It is probably true to say that if it had not been for solid injection the use of the oil engine in many of its present applications, more particularly in traction and in flight, would never have been brought about owing to the prohibitive space, weight and complication of the air injection engine.



A new six-cylinder, four-stroke oil engine developed by Vickers-Armstrongs Ltd. The illustrations to this article are reproduced by courtesy of Vickers-Armstrongs Ltd.

After the War the oil engine output of Vickers Ltd. consisted mainly of machinery of Admiralty type, culminating in the huge air injection engines of 5,000 h.p. fitted in the "Thames" class of submarine. Subsequently the firm set themselves to develop new engines of their own type. The first of the new designs was an eight-cylinder engine of 1,200 b.h.p. at 500 r.p.m., several of which were fitted in Portuguese submarines built at Barrow. Following upon the successful running of these engines during long trials and on actual service, a smaller six-cylinder engine was developed and was fitted in two Estonian submarines. This engine, shown in the upper photograph on this page, proved equally successful, and we give a brief explanation of its main features.

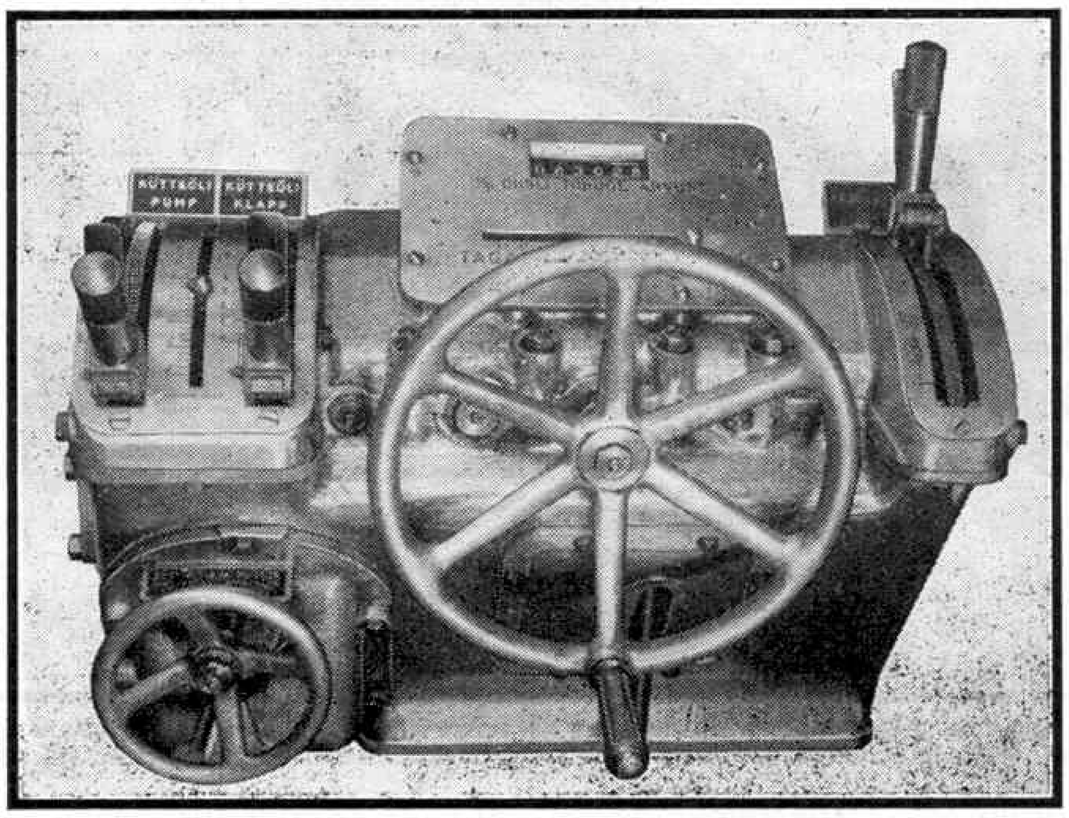
The engine works on the four-stroke cycle, each cylinder thus giving one firing impulse during two revolutions, as do most motor-car petrol engines. The fuel is not admitted in the form of gas during the suction stroke, as in petrol engines, but is sprayed, towards the end of the upward stroke, into the air compressed above the piston. The compression pressure is about 450 lb. per sq. in., which results in the temperature of the air being sufficiently high to ensure ignition of fuel injected into the cylinder.

The fuel, which is fairly heavy oil, is handled by a battery of small pumps situated below the control levers and driven by the engine. These fuel pumps have their output controlled by a lever acting on their suction valves. They discharge into a common main, or "rail" as it is usually termed, and maintain in this rail a pressure of from 2,000 lb. to 8,000 lb. per sq. in., the pressure varying with the power required.

From the rail a pipe leads to a spray valve on each cylinder, this valve being opened for a fraction of a second at the beginning of each firing stroke by a cam-operated tappet. The opening of the spray valve is regulated according to the power and speed of the engine. The spray valve admits the fuel to a nozzle with a number of very small holes in it. The fuel issues from these holes at high velocity in the form of fine highly penetrating needles, passes into the heated air and immediately ignites, thus giving the required power impulse.

In other particulars the engine is on more or less orthodox lines, although in order to save weight and space drop-forged columns and a semi-welded bedplate are used. The air and exhaust valves are in duplicate, which give smoothness of operation and great durability.

The engine is of the reversing type. On stopping the engine the reversing wheel is free to be turned, thus lifting the push rods, then sliding the camshaft till the reverse cams are below the push rods, and finally dropping the latter into contact with the cams. The engine is started by compressed air admitted by a lever-operated valve. As soon as the engine is moving smartly on air, the spray valves are put into operation. The engine now runs on fuel, and the air starting lever is put to the "off" position.

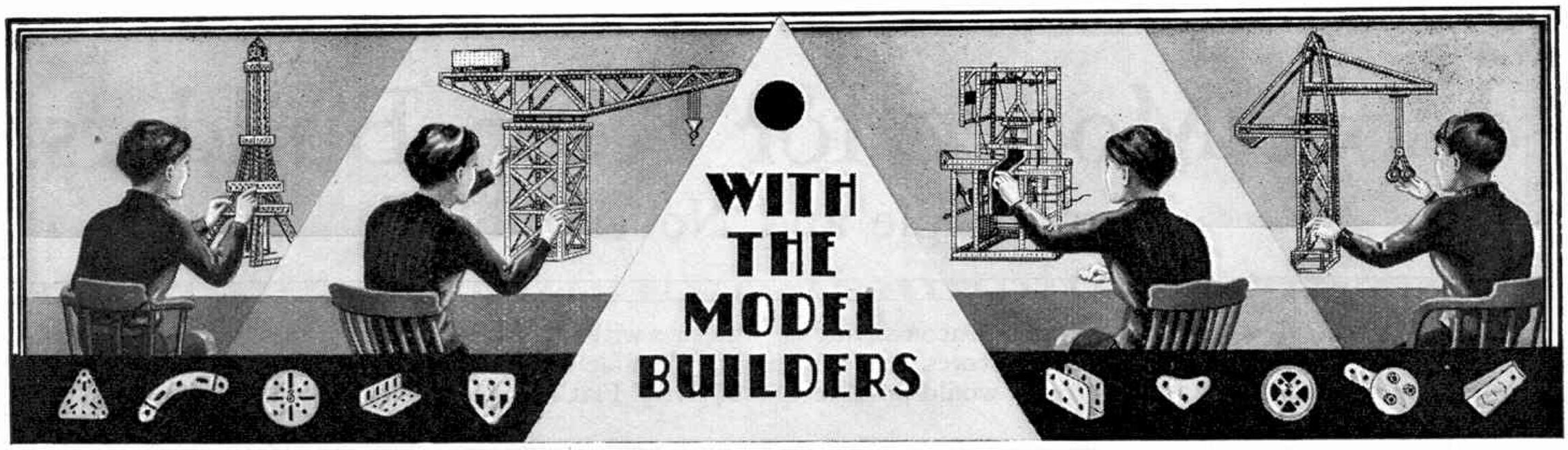


The control gear of the new Vickers oil engine shown in our upper illustration. The purpose of each control is explained in this article.

The control gear is very simple, and is shown in the lower illustration. The three levers are for the fuel pump, the spray valve and for air starting respectively. The large wheel is for reversing the engine, the smaller one being for adjusting the timing of injection, its effect being analogous to that of moving the "spark" in a motor car engine.

The large wheel seen at the base of the engine in our upper illustration is for turning the engine during refit or valve-setting. Just above this wheel is the lever used for engaging the turning gear.

A considerably larger standard engine of the new design is now in the final stages of development at the Barrow works of Vickers-Armstrongs Ltd. All the new engines occupy much less space than earlier ones, and weigh only about 30 lb. per brake horse power, which is only half the corresponding weight of early Vickers designs. The saving of weight and space they make possible will be of great assistance in the design of vessels in which they may be fitted.



A NEAT MECCANO CYCLE ACCESSORY

A useful accessory for a bicycle has been designed in Meccano by P. Le Ferre, Harleston, Norfolk. It is a "stop" indicator, which is attached to the rear of the bicycle and lights up whenever the brakes are applied, thus giving warning to following traffic.

It consists of a box-shaped structure built up from 5½" and 2½" Angle Girders. Three of the sides and the ends are filled in with 5½" by 2½" and 2½" by 2½" Flexible Plates. The remaining side is filled by a 5½" by 2½" rectangular sheet of tinplate in which the word "Stop" is cut out in bold capitals. The tin is backed by a sheet of red celluloid and holes are punched in it to enable it to be bolted in position. Inside the box is a flashlamp bulb, which is screwed into a Meccano Lamp Holder. The indicator is fastened to the rear forks of the bicycle so that the word "Stop" shows to the rear. This is done by means of suitable brackets made from Strips, which are electrically "earthed" to the frame, if necessary removing the enamel from the brackets and forks where they make contact with each other.

The device can be operated either from the headlamp battery or from a separate battery. One terminal of the battery is earthed to the frame and the other terminal is connected by wire to an insulated Strip fastened to the rear brake lever. A second insulated Strip is fixed to the handlebars, in such a position that when the brake is applied the Strips make contact with each other. The handlebar contact is connected to the terminal of the Lamp Holder. It will be seen that when the brake lever is pulled upward to apply the brake, the circuit is completed and the indicator is illuminated.

A BUILT-UP UNIVERSAL COUPLING

In constructing model motor cars, or other models in which it is required to transmit the drive from the gearbox or driving unit to a driven shaft a short distance away, it is necessary to employ a positive drive that takes up as little space as possible. This can be done by using either Sprocket Chain drive or shaft drive, but it sometimes happens that the driving and driven shafts are out of line, so that if the shaft method is used a flexible coupling is needed in the transmission. The Universal Coupling is the best part to use for this purpose, but when this is not available a built-up coupling devised by D. Purvis, Stafford, can be used satisfactorily. It consists of two small Fork Pieces and a ⅜" Steel Ball (Part No. 117). The forks on one of the Fork Pieces are bent inward slightly so that the Steel Ball is gripped firmly between them. The second Fork Piece is treated similarly, and is then pressed on to the Steel Ball so that its arms interlace with those of the first Fork Piece. If desired End Bearings can be used in place of Fork Pieces.

We have tested the device and find that it is quite efficient and will transmit the drive through all angles up to about 135 degrees between the driving and driven shafts. At a sharper angle the Fork Pieces bind and tend to lever each other off the Steel Ball.

Purvis discovered a novel use for this coupling in building an adjustable lamp, the light of which can be thrown in any required direction. Three Rods are joined by two built-up couplings. One end Rod is attached to a base, and at the end of the third is fixed a Headlamp, which is connected to a 4.5-volt flashlamp battery. A lamp of this kind is useful for illuminating dark corners when assembling intricate models.

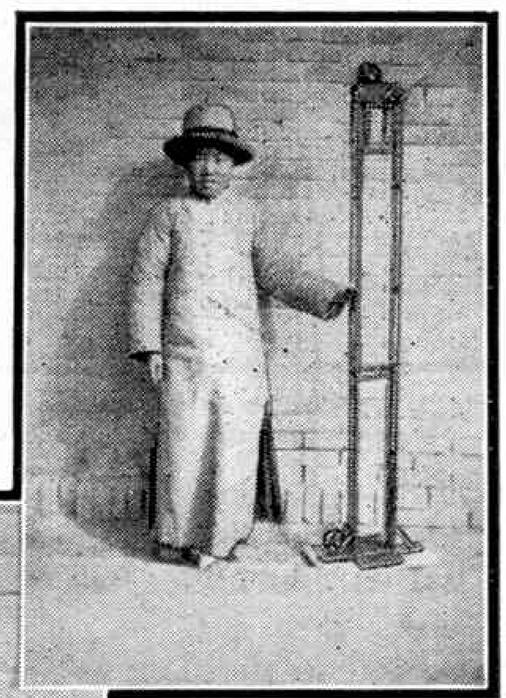
AN EXCITING GAME WITH DINKY TOYS RACING CARS

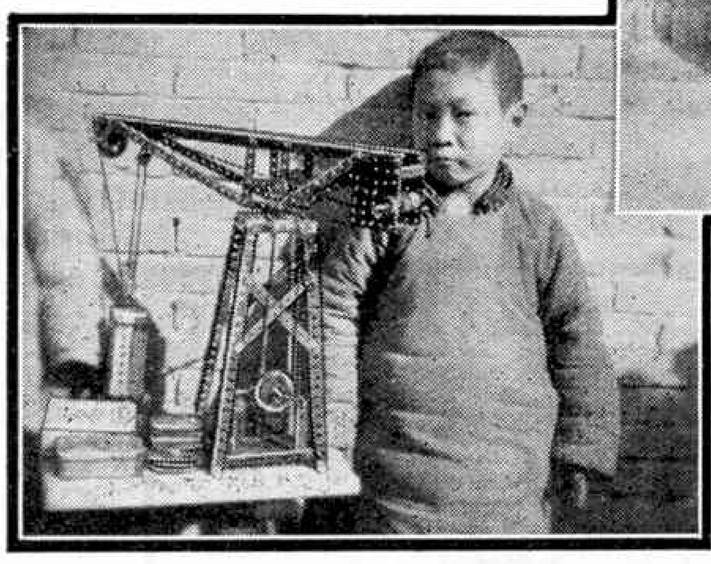
T. Wilson, Coventry, visited a "Wall of Death" show at a fair, and was so impressed by the performance that he decided to make a miniature "Wall of Death" of his own. With the aid of a large enamelled bowl, about 14 in. in diameter and 4½ in. deep, and a Dinky Toys Racing Car, he devised a jolly and exciting game. The Racing Car was placed on the bottom of the bowl, which was then held between both hands and given a slow and steady circular motion. This set the car racing round and round the bowl, and by gradually increasing the speed of the motion the car slowly climbed up the side! Then by varying the speed of the motion the car was made to ride up and down the wall just like the real car does on the Wall of Death.

Wilson found that the best results were obtained by using a wet bowl, as on a dry surface the Racing Car tended to turn over when coming to rest or starting off.

A great deal of fun can be obtained in trying to keep two Racing Cars racing round the bowl at the same time, and Wilson assures us that with practice the feat can be accomplished. If the bowl available is of small diameter the small M.G. Sports Car or the Racer (Dinky Toys Nos. 35b and 35c) will be found suitable.

A good plan and one that gives scope for model-building ingenuity, is to construct a Meccano mechanism for operating the bowl. For example, a variable eccentric on which a frame containing the bowl is mounted might be used. The eccentric, driven by an Electric Motor, would rotate the bowl and set the car in motion, and its movement up and down the wall could then be controlled from the Transformer by varying the speed of the Motor. We shall be glad to receive details of experiments made by readers in this direction so that particulars can be given in future issues of the "*M.M.*"





The boys of the Catholic Mission, at T'ao Nan, Manchoukuo, are keen model-builders, and in this photograph we see two of them with examples of their work.

MOTOR CAR CONSTRUCTOR PARTS USED WITH MECCANO

Owners of No. 2 Motor Car Constructor Outfits will be interested in the ingenious models devised by P. Hornby, Northwich. Hornby discovered that he could convert an ordinary two-seater car into a four-seater in a very simple manner. In building a car such as M1 and M4 shown in the Instruction Leaflet, he omits the body Centre Section, thus leaving sufficient space to incorporate a second seat. An alternative method is to lengthen the chassis of the car with a few standard Meccano parts. The front part of the car is assembled as shown in the Instructions Leaflet, and the driving seat is bolted in position. Then two 3" Strips are bolted to the upper rear corners of the Dash. The rounded Rear Section is fitted with the clockwork motor, and Flat Brackets are mounted on the forward bolts, the Flat Brackets being bolted through their circular holes so as not to obstruct the hole for the wheel axle. The Rear Section is then bolted to the 3" Strips and also to the Frame Side Member. This method of construction provides ample space for a rear seat, and the small space left in the sides of the car can be filled in with stiff card painted to match the colour scheme of the model.

As the position of the rear axle is different from that in the normal model, the drive must be altered slightly. The rear axle is fitted with the driving pinion and journalled in the usual manner so that the Pinion meshes with the contrate wheel of the Motor. The Wheels are mounted on a standard Meccano Rod journalled 1½ in. in front of the rear axle, and the drive is taken to the Rod through Sprocket Wheels and Chain.

MODEL RAILWAY POINTS MADE WITH MECCANO

Railway points provide an unusual subject for the serious Meccano model-builder. There is plenty of scope for interesting work in this direction, however, especially if the more elaborate systems of points are modelled.

L. Mezzetti, Rome, sent details of a set of three-way points that he has constructed. The main rails, which have a gauge of 2½ in., are made from 12½" and 24½" Angle Girders, rigidly connected by 2½" Angle Girders. Where the track divides, the rails are made from Strips, placed in positions similar to the component rails of actual points. The movement of the points is controlled by two levers connected by a series of links to the rails, and the complete unit is mounted on a basework consisting of 1½" Angle Girders.

An outstanding feature is the neatness of the guides used for the operating links. They are made from Double Brackets, inside which an Angle Bracket is bolted by its slotted hole, sufficient space being left for a Strip to slide freely in the Double Bracket.

We congratulate Mezzetti on the neatness and originality of his model, and hope that he will continue to show the same enterprise in his choice of subjects.

MECCANO SHOCK ABSORBERS

Several model-builders have written to us suggesting that special parts should be introduced for use in constructing miniature shock absorbers. The proposal is interesting, but we do not consider that special parts need be introduced, for many of the standard parts can be adapted for the purpose quite easily. Car type friction disc dampers can be constructed by gripping a 1" loose Pulley, fitted with a 1" Rubber Tyre, between two Bush Wheels. The friction between the Tyre and the faces of the Bush Wheels effectively damps any shocks to which the unit is subjected.

A novel type of shock absorber for use in large models can be made by placing a number of Rubber Rings between Bush Wheels. One of the Bush Wheels is fixed to the chassis of the model and the other is free on a Rod. Any shocks to which the model is subjected will be absorbed by the compression of the Rubber Rings. This type of shock absorber could be used for "Oleo" legs for large Meccano model aeroplanes, or for damping vibration and noise in models.

A similar shock absorber that would be useful in building such models as electric fans can be made with the largest Rubber Tyres. One or two Tyres placed between the base of the fan and the table, or other support on which it is placed, will greatly reduce the noise made by the whirling blades. There are many other instances where Tyres will be found useful in this respect, and it may be mentioned that cushions formed with Tyres are ideal for preventing nuts and bolts working loose after a model has been working for some time.

SPLIT PINS

P. Cardew, Lincoln, suggests that split pins should be included in the Meccano system. In real engineering split pins are used extensively for locking nuts and for holding in place oscillating parts of light machinery. If split pins were introduced into the Meccano system, however, holes would be required in the Rods, and this would not only weaken them but would render the Rods less suitable for other purposes. A much better plan is to use Spring Clips and Washers, or Collars.

A SPECIAL MECCANO CHUCK

P. Weston, York, suggests that special Meccano parts suitable for building up a drill chuck would be useful. He points out that the present Coupling, which is often used for this purpose, takes drills only up to ⅛" diameter, and even of these the smaller ones cannot be held firmly. The idea has possibilities, but we do not think such specialised parts would be generally popular.

More Models for Keen Builders

Four Simple and Novel Subjects

MOST model-builders will have seen a bacon-slicing machine in operation at the grocery stores, and no doubt have thought what a fine subject it would provide for a model. These machines are by no means so complicated as they appear to be, and by exercising a little ingenuity a good working model can be built quite easily from a few simple parts. An example of what can be done in this direction is shown in Fig. 1.

Construction of the model is commenced by fastening two double strips 1 along the sides of a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate 2. Each of the two double strips consists of two $5\frac{1}{2}''$ Strips spaced apart by two washers, and together they provide slides for four Double Brackets bolted underneath the $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate 3 that forms the carriage on which the bacon is placed. A 2″ Strip is fixed by a lock-nutted Bolt 4 to the centre of the Flanged Plate 3, and the other end of the Strip is fastened by a second lock-nutted bolt to the arm of a Crank. The latter is secured to the upper end of a $1\frac{1}{2}''$ Rod that is journalled in the Flanged Plate 2.

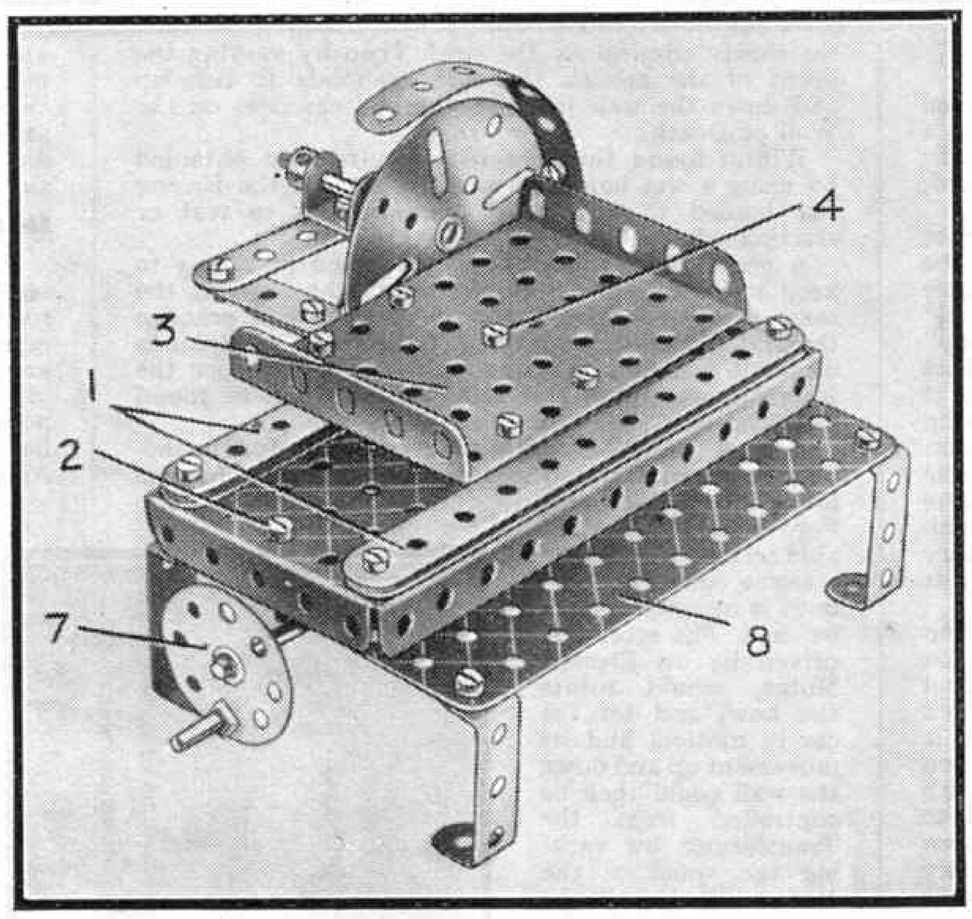


Fig. 1. A cleverly built working model of a bacon slicer, which is capable of carrying out the chief movements of the real machine.

Two $1'' \times 1''$ Angle Brackets 5 are bolted to the flanges of the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate, and their horizontal arms are extended by two $1\frac{1}{2}''$ Strips. The ends of these Strips are joined by a $3\frac{1}{2}''$ Strip, to the centre of which is fastened a Double Bracket.

The revolving cutting knife is represented by a Face Plate, mounted on a 2″ Rod 6 that also carries a $\frac{1}{2}''$ fast Pulley and is journalled in the Double Bracket. A guard for the knife is provided by a $3\frac{1}{2}''$ Strip curved to the required shape and fixed in the position shown by an Angle Bracket.

The machine is operated by rotating the Bush Wheel 7. This is fitted on one end of a $4\frac{1}{2}''$ Rod that is journalled in a Double Bent Strip and an Angle Bracket, both of which are bolted to the underside of the $5\frac{1}{2}'' \times 3\frac{1}{2}''$ Flat Plate 8, but spaced from it by putting two washers on each bolt. The Rod carries two $\frac{3}{4}''$ Contrate Wheels, one of which is fixed on one end of the Rod and the other at its middle point. The Contrate Wheel in the middle of the Rod meshes with a $\frac{1}{2}''$ Pinion on a 2″ Rod 9, which is journalled in a Double Bracket that also is bolted underneath the $5\frac{1}{2}'' \times 3\frac{1}{2}''$ Flat Plate 8. The $5\frac{1}{2}'' \times 3\frac{1}{2}''$ Flat Plate is attached by two $\frac{3}{4}''$ Bolts to the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate, and then the Contrate Wheel on the end of the $4\frac{1}{2}''$ Rod is adjusted so that it meshes with a $\frac{1}{2}''$ Pinion on the lower end of the $1\frac{1}{2}''$ Rod carrying the Crank. The drive to the knife is transmitted by a Driving Band from the 1″ Pulley on Rod 9 to the $\frac{1}{2}''$ Pulley on the shaft of the knife.

The machine is mounted on four legs consisting of four $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips, and these are bolted to each corner of the $5\frac{1}{2}'' \times 3\frac{1}{2}''$ Flat Plate.

Parts required to build model bacon slicer: 4 of No. 2; 2 of No. 3; 1 of No. 6; 2 of No. 6a; 6 of No. 11; 2 of No. 12; 2 of No. 12a; 1 of No. 15a; 3 of No. 17; 1 of No. 22; 1 of No. 23; 1 of No. 24; 1 of No. 26; 2 of No. 29; 23 of No. 37; 1 of No. 45; 4 of No. 48; 1 of No. 52; 1 of No. 52a; 1 of No. 53; 2 of No. 59; 1 of No. 62b; 1 of No. 109; 6 of No. 111c; 1 of No. 115.

The best starting point in building the petrol driven invalid chair shown in Fig. 4 is the seat. This consists of a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate, to one side of which is bolted a $1\frac{11}{16}''$ radius Curved Plate to form the rounded front. A $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plate 1 is fastened to the Curved Plate by two Angle Brackets, and the sloping foot-rest 2 is a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate that is secured to the forward edge of the $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plate 1 by two Obtuse Angle Brackets.

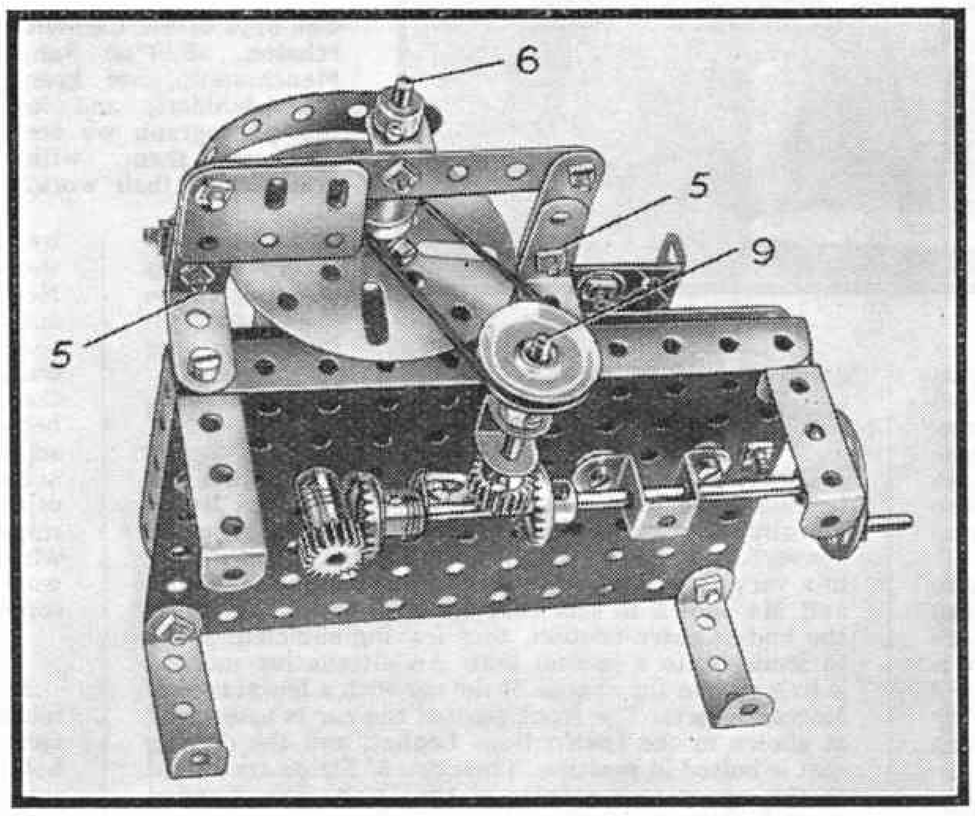


Fig. 2. An underneath view of the bacon slicing machine, showing the drive to the cutting knife and the bacon carriage.

Two further Obtuse Angle Brackets are used to fasten a $1\frac{1}{2}''$ Strip 3 to the front of the $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate, the bolts holding also a Double Bent Strip. A 2″ Rod 4 is journalled in the middle holes of the $1\frac{1}{2}''$ Strip and the Double Bent Strip, and on its lower end is fixed a large Fork Piece with its arms downwards. Two 1″ Corner Brackets bolted to the arms of the Fork Piece form the bearings for the front wheel axle, which is a 1″ Rod. The Rod is held in place by two Spring Clips, and between the two Corner Brackets it carries a 1″ loose Pulley fitted with a Rubber Tyre. The Rod is held in place by a Collar above the $1\frac{1}{2}''$ Strip, and at its upper end is fastened a Coupling, which carries in one of its end transverse bores a $3\frac{1}{2}''$ Rod that forms the steering shaft. The steering handle is a 2″ Rod held in a Coupling fixed to the shaft.

The rear axle is a 4″ Rod 4, which is journalled in two $5\frac{1}{2}$″ Strips secured to Strip Plate 1 by a $2\frac{1}{2}$″ × $\frac{1}{2}$″ Double Angle Strip and two Angle Brackets. A 1″ Pulley fastened at the centre of the rear axle is driven by a Driving Band from the small pulley of a *Magic* Motor bolted underneath the seat of the carriage. In order to prevent the Driving Band slipping off the Pulleys, it is passed around a $\frac{1}{2}$″ loose Pulley mounted on a 3″ Rod journalled two holes in front of the back axle. The axle is covered by a $1\frac{11}{16}$″ Curved Plate 6, which represents the petrol engine casing and is fastened in position by two Angle Brackets. The cylinder of the engine comprises a $\frac{1}{2}$″ loose Pulley and a $\frac{1}{2}$″ fast Pulley, both of which are secured by a $\frac{3}{4}$″ bolt to the Curved Plate 6.

Parts required to build model invalid chair: 2 of No. 2; 2 of No. 5; 1 of No. 6a; 2 of No. 10; 10 of No. 12; 4 of No. 12c; 1 of No. 15a; 1 of No. 16; 1 of No. 16b; 2 of No. 17; 1 of No. 18b; 2 of No. 20a; 1 of No. 22; 1 of No. 22a; 2 of No. 23; 1 of No. 23a; 6 of No. 35; 48 of No. 37; 1 of No. 37a; 8 of No. 38; 1 of No. 45; 1 of No. 48a; 1 of No. 51; 1 of No. 59; 2 of No. 63; 2 of No. 90; 4 of No. 90a; 1 of No. 111a; 1 of No. 116; 2 of No. 133a; 2 of No. 142a; 1 of No. 142c; 3 of No. 188; 1 of No. 199; 1 of No. 200; 1 *Magic* Motor.

Fig. 3 shows a model delivery van built up of standard Meccano parts, and parts from a No. 2 Motor Car Constructor Outfit. In making it the chassis is first built up from the Constructor Outfit parts, and the bonnet, the dash and the centre section. The radiator and steering gear are also assembled as described in the Instructions Leaflet, and a seat is secured in position between the sides of the dash. The Motor is then bolted in position between the sidemembers of the chassis, the bolts holding also the supports for the rear mudguards and two $2\frac{1}{2}$″ × $1\frac{1}{2}$″ Flexible Plates. These Flexible Plates form the lower ends of the sides of the body of the van and each of them is extended upwards by a $3\frac{1}{2}$″ × $2\frac{1}{2}$″ Strip Plate.

Two $5\frac{1}{2}$″ Strips are next bolted along the upper sides of the $3\frac{1}{2}$″ × $2\frac{1}{2}$″ Strip Plates and between them a $5\frac{1}{2}$″ × $2\frac{1}{2}$″ Flexible Plate, which forms the roof, is fastened by Angle Brackets. The $5\frac{1}{2}$″ Strips are also supported from centre section by two compound strips each built up from two $2\frac{1}{2}$″ small radius Curved Strips overlapped three holes, and from the ends of a $2\frac{1}{2}$″ × $\frac{1}{2}$″ Double Angle Strip bolted to the dash by two $1\frac{1}{2}$″ Strips. The windscreen shield at the front of the roof consists of a $2\frac{1}{2}$″ Strip secured in position by two Obtuse Angle Brackets as shown in the illustration.

The back of the van is formed by a further $3\frac{1}{2}$″ × $2\frac{1}{2}$″ Strip Plate, the corners of which are fastened to the sides of the van by Angle Brackets. To complete the model, the running boards and mudguards are bolted to their supports, and the rear axle is mounted in the chassis and geared to the Motor pinion.

Meccano parts required to build model delivery van: 2 of No. 2; 1 of No. 5; 2 of No. 6a; 10 of No. 12; 2 of No. 12c; 26 of No. 37; 1 of No. 48a; 4 of No. 90a; 2 of No. 188; 1 of No. 192; 3 of No. 194.

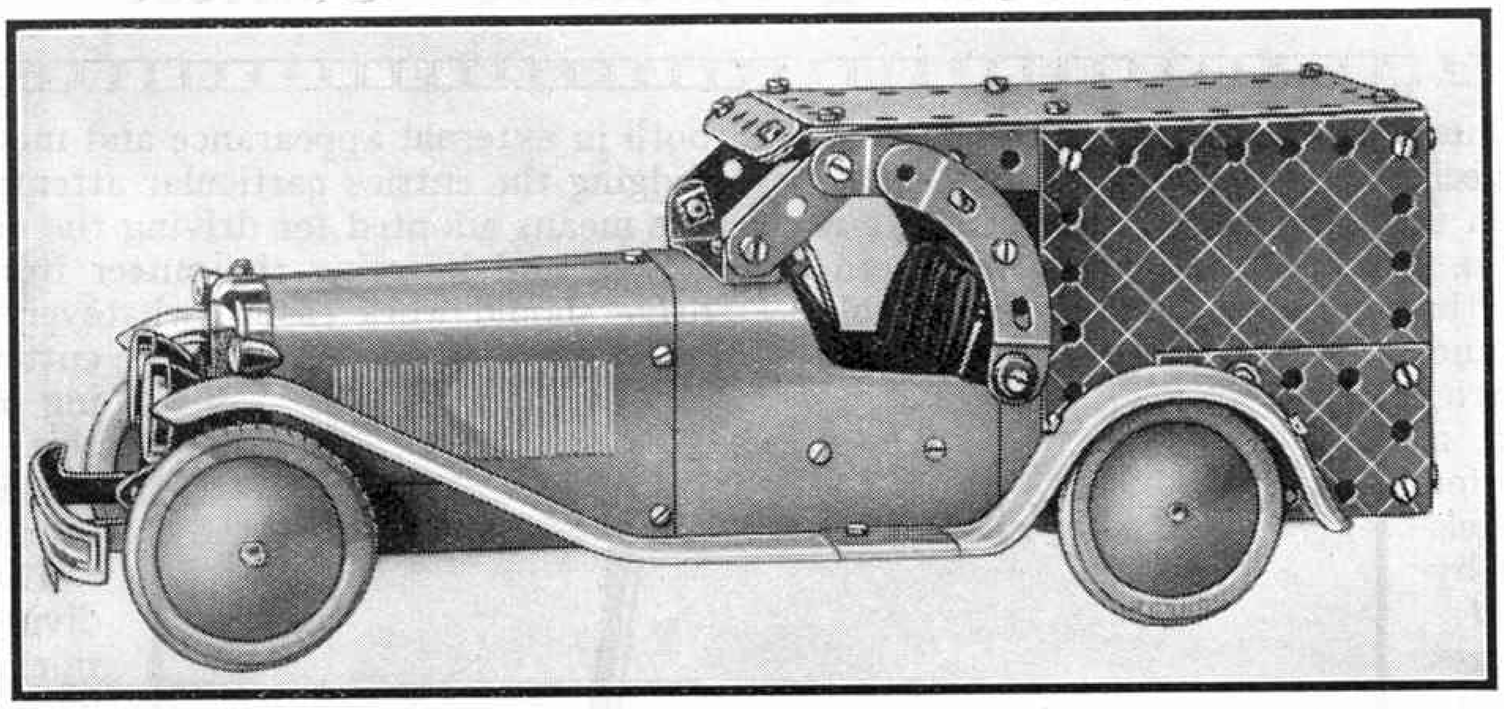


Fig. 3. A fine model in which Motor Car Constructor parts are used in combination with ordinary Meccano parts.

The remaining model to be described this month is a petrol-driven electric generating set. This is not illustrated, but its construction is easy to follow. A $5\frac{1}{2}$″ × $2\frac{1}{2}$″ Flanged Plate provides a base for the model, and to it two Flanged Sector Plates are fastened vertically and seven holes apart by means of Flat Brackets. The space between the flanges of the Sector Plates is filled in on each side by one $3\frac{1}{2}$″ × $3\frac{1}{2}$″ Flanged Plate and one $3\frac{1}{2}$″ and five $2\frac{1}{2}$″ Strips, to form the crank casing. The top of the crank casing is covered by three $3\frac{1}{2}$″ Strips secured in position by Angle Brackets, and on them two Sleeve Pieces, fitted at their ends with $\frac{3}{4}$″ Flanged Wheels, are mounted by 1″ × $\frac{1}{2}$″ Angle Brackets to represent cylinders. A 2″ Rod locked in the bosses of the Flanged Wheels forms the piston rod.

The crankshaft is a $6\frac{1}{2}$″ Rod and is journalled in the two Flanged Sector Plates. It carries a flywheel consisting of two 2″ Pulleys bolted together. The dynamo is represented by two Boiler Ends fastened together by two 2″ Rods. The 2″ Rods pass also through a $2\frac{1}{2}$″ Strip bolted to the flange of the $5\frac{1}{2}$″ × $2\frac{1}{2}$″ Flanged Plate forming the base of the model, the Strips providing support for the dynamo.

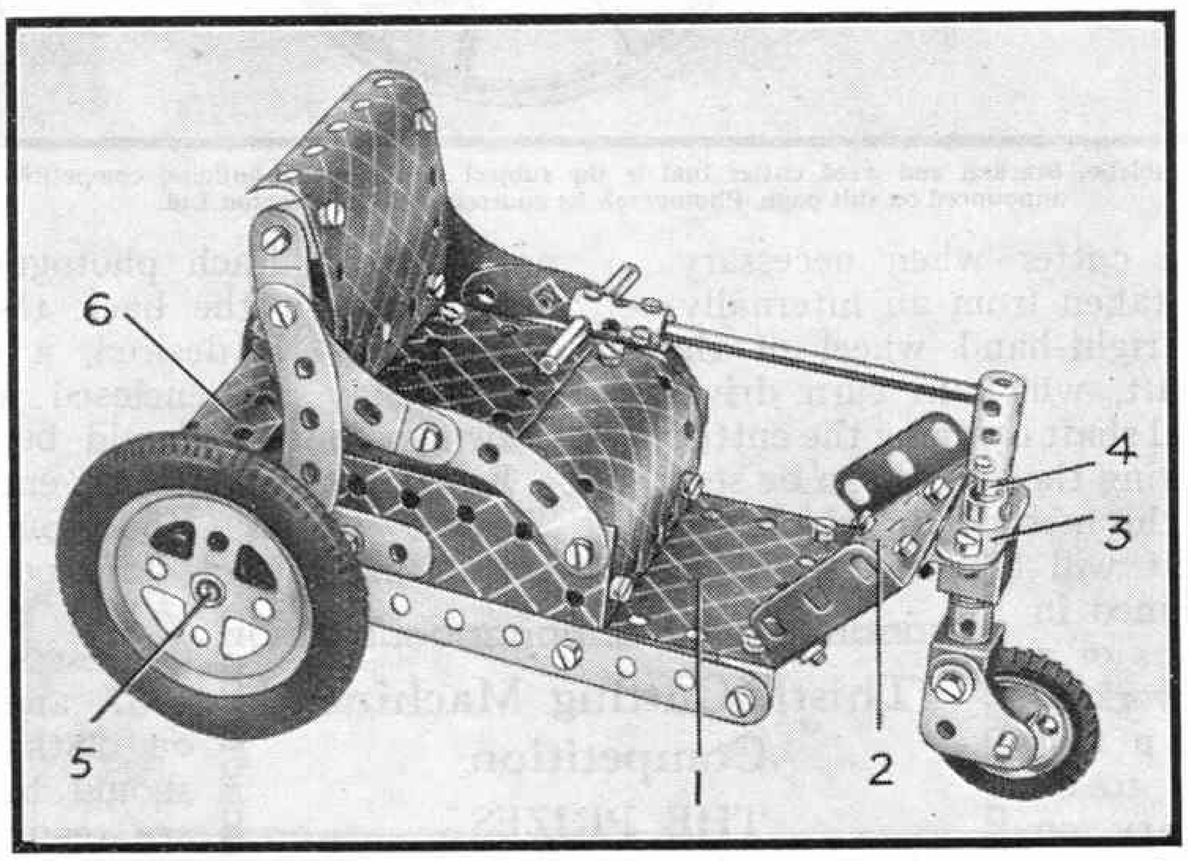


Fig. 4. An interesting model of an unusual type. This invalid chair is driven by a Magic Motor and is easy to build.

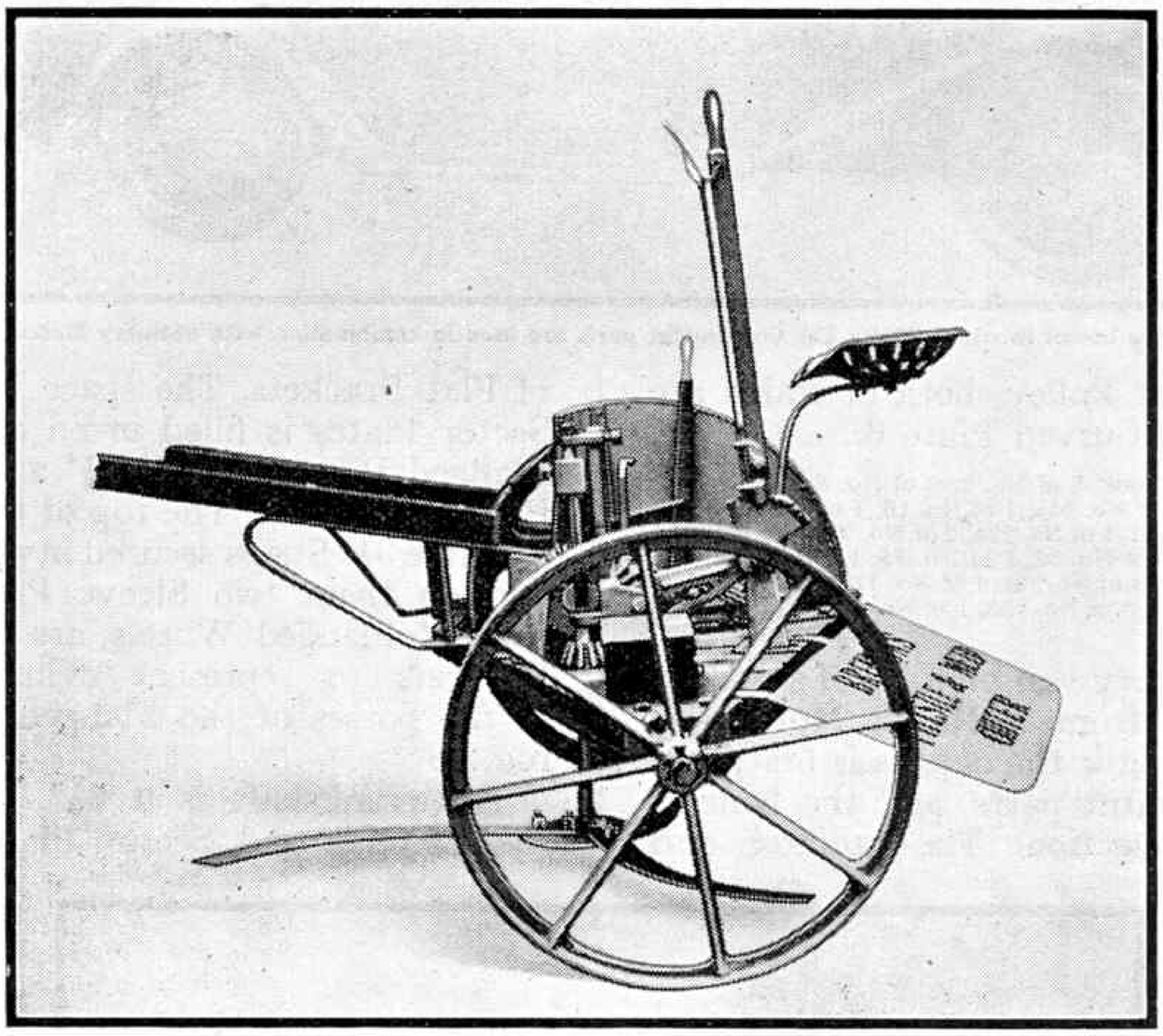
The dummy valve gear of the engine is constructed by fastening a 1″ Pulley on the crankshaft. The lower end of a 2″ Rod journalled in two Angle Brackets bolted to the end of the crankcase, rests on the boss of the Pulley, so that each time the crankshaft is rotated the bolt in the boss of the Pulley strikes the Rod and lifts it a short distance. At its end the crankshaft carries also a fork coupling. This is built up by placing a Chimney Adaptor and a large Fork Piece on the shaft and pressing them against the 1″ Pulley of the valve gear. The boss of the Fork Piece fits inside the Chimney Adaptor, and to each arm of the Fork Piece a Collar is fastened by a $\frac{1}{2}$″ Bolt.

Parts required to build petrol driven generating set: 5 of No. 3; 11 of No. 5; 4 of No. 10; 4 of No. 12; 2 of No. 12b; 1 of No. 14; 2 of No. 16; 2 of No. 17; 2 of No. 20a; 2 of No. 20b; 4 of No. 35; 48 of No. 37; 2 of No. 38; 2 of No. 48b; 1 of No. 52; 2 of No. 53; 2 of No. 54a; 2 of No. 111c; 2 of No. 162a; 2 of No. 163.

Meccano Model-Building Competition

"Thistle-Cutting Machine" Contest

On this page we illustrate an interesting agricultural machine designed specially for cutting down thistles, bracken and weeds on farmland and large estates. It is manufactured by Wm. Brenton Ltd., Polbathic, Cornwall, and has features that make it a particularly suitable subject for a Meccano model. This month, therefore, we offer a range of fine prizes for the best working models of this machine built by readers of the *"M.M."*



The thistle, bracken and weed cutter that is the subject of the model-building competition announced on this page. Photograph by courtesy of Wm. Brenton Ltd.

All the main features of the machine can readily be seen in the illustration, and competitors should have no difficulty in completing their models. The thistles are cut down by a rotating three-bladed horizontal cutter, which is mounted at the lower end of a spindle driven from the right-hand wheel of the machine. Separate levers are provided for raising the cutter from the ground when the machine is not cutting, or when it is travelling to or from the working site, and for disconnecting the drive to the cutter when necessary.

The drive to the cutter is taken from an internally-toothed gear, fixed on the right-hand wheel of the machine, to a horizontal shaft, which in turn drives through bevel gears the vertical shaft carrying the cutter. The lever for raising and lowering the cutter can be seen beside the driver's seat, and the method by which it is connected to the cutter shaft will be clear from the illustration. The shaft is retained in any desired position by means of a ratchet device on the lever, working on a toothed quadrant, and a foot lever is provided to allow it to be raised quickly when necessary on account of any obstacle. The clutch that disconnects the drive to the cutter is on the right-hand side of the driver's seat.

The machine is hauled by one horse, harnessed between shafts placed one at each side of the right-hand road wheel. With the shafts in this position the horse walks on the cut down area, so that thistles, bracken and other weeds are not trodden down.

Competitors may use any size of Outfit or number of parts in building their models, and the aim should be to copy the actual machine as closely as possible, both in external appearance and method of working. In judging the entries particular attention will be given to the means adopted for driving the cutter shaft, and for raising and lowering the cutter from the ground. The drive should work easily, whatever the position of the cutter shaft, and devising means of effecting this will provide scope for ingenuity and resource.

The contest will be divided into two Sections (A) for competitors living in the British Isles (B) for competitors living Overseas. A separate set of prizes will be awarded in each Section as listed in the panel at the foot of the page. Readers of all ages are eligible to take part in the competition and in order to give each competitor an equal chance his age will be taken into consideration when his model is judged.

A good photograph or a drawing is all that is required for the purposes of the competition, and actual models must not be sent. Each photograph or drawing submitted must bear on the back the sender's age, name and full address. If desired, a written description of the model may be enclosed with the photographs or drawings, but it should be as brief as possible.

Envelopes containing entries should be addressed "Thistle Cutter Model-Building Contest," Meccano Ltd., Binns Road, Liverpool 13.

The Home Section (A) of the Contest will close on 31st December, 1937, and the Overseas Section (B) on 28th February, 1938. Entries should be posted as soon as they are ready and not held over until near the closing dates.

It should be noted that photographs or drawings of prize-winning models become the property of Meccano Ltd., and will not be returned. Unsuccessful entries, however, will be returned to the senders provided that they are accompanied by stamped and addressed envelopes for that purpose.

Competitors may send in more than one entry if they wish, but no competitor will be awarded more than one prize. If several models are entered they will be judged on their joint merits.

"Thistle-Cutting Machine" Competition

THE PRIZES

A separate and complete set of prizes as listed below will be awarded in each of the Sections A and B:

1st Prize, Meccano or Hornby Goods value £3/3/-.
2nd Prize, Meccano or Hornby Goods value £2/2/-.
3rd Prize, Meccano or Hornby Goods value £1/1/-.
5 Prizes of Meccano or Hornby Goods value 10/6.
5 Prizes of Meccano or Hornby Goods value 5/-.

Model-Building Competition Results

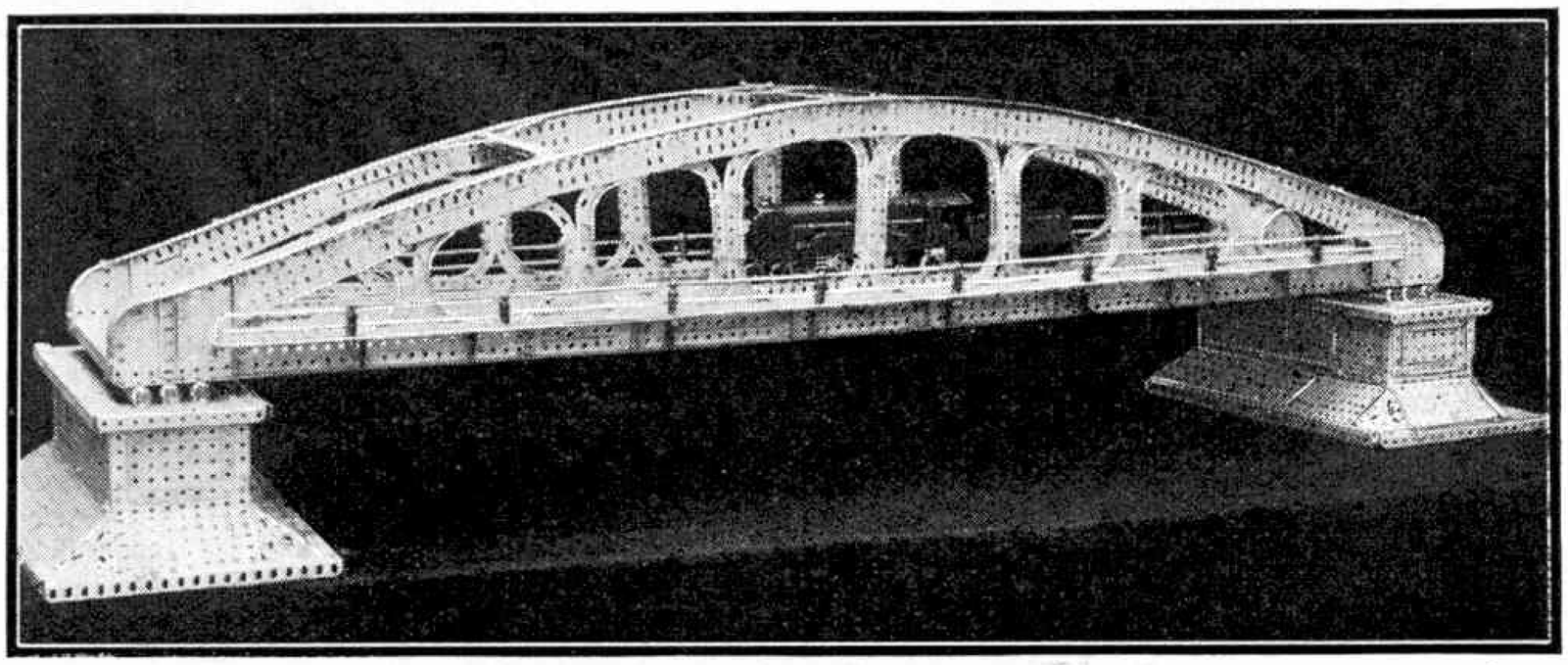
By "Spanner"

April "Bridge" Contest (Overseas Section)

The complete list of prizewinners in the Overseas Section of the April "Bridge" Model-Building Competition is as follows:

1st Prize, Meccano or Hornby products value £3/3/–: J. Willems, Hoboken, Antwerp, Belgium. **2nd, products value £2/2/–:** J. De Proft, Willebroeck, Belgium. **3rd, products value £1/1/–:** P. Giese, Buenos Aires.

Products value 5/–: L. Linder, Stockholm; R. Myburgh, Claremont, Cape Province, S. Africa; D. Hofsommer, The Hague, Holland; H. Clark, Hokianga, New Zealand; J. Diehl, Buenos Aires; L. M. Chew, Singapore; D. Mullick, Calcutta; A. Gilissen, Maastricht, Holland; W. Thompson, Melbourne; E. Bourgault, T'ao-Nan, Manchoukuo.



This fine model girder bridge is a splendid example of Meccano construction. It was built by J. Willems, Antwerp, and was awarded First Prize in the "Bridge" Model-Building Competition.

The fine model of an arched girder bridge illustrated on this page won First Prize for J. Willems. It easily outshone all the other entries by its splendid proportions, beautiful lines and excellent workmanship. The bridge is built chiefly of Angle Girders and Strips. The roadway is approximately 5 ft. in length, and at its ends the bridge is supported by expansion rollers from two piers.

J. De Proft, another Belgian competitor, succeeded in winning the Second Prize with a model of a lifting bridge that also is illustrated on this page. The central lifting span is supported by cables at each end from two towers mounted on large piers.

Third Prize was won by a well-built bascule bridge constructed by Pablo Giese of Buenos Aires, a deciding factor in making this award being the good work done in designing the mechanism for raising and lowering the span. An Electric Motor is mounted on a gantry over the approach roadway, and through reduction gearing it drives a Rod carrying two Pinions. These Pinions mesh with and operate two Rack Strips, which are pivotally attached to the end of the centre span. The mechanism is capable of raising the span into an almost vertical position, and the details of its construction show that much care was taken over this part of the model.

A simpler bascule bridge built by R. Myburgh, Claremont, Cape Province, was awarded one of the smaller prizes. In this model the centre span pivots on two Hub Discs, and is raised and lowered by means of a Crank Handle. The bridge is provided with a railway track built up from Angle Girders, and also with a roadway for Dinky Toys Motor Cars. A novel feature is that barriers are automatically placed at the ends of the approach roadways when the central span is raised from a horizontal position.

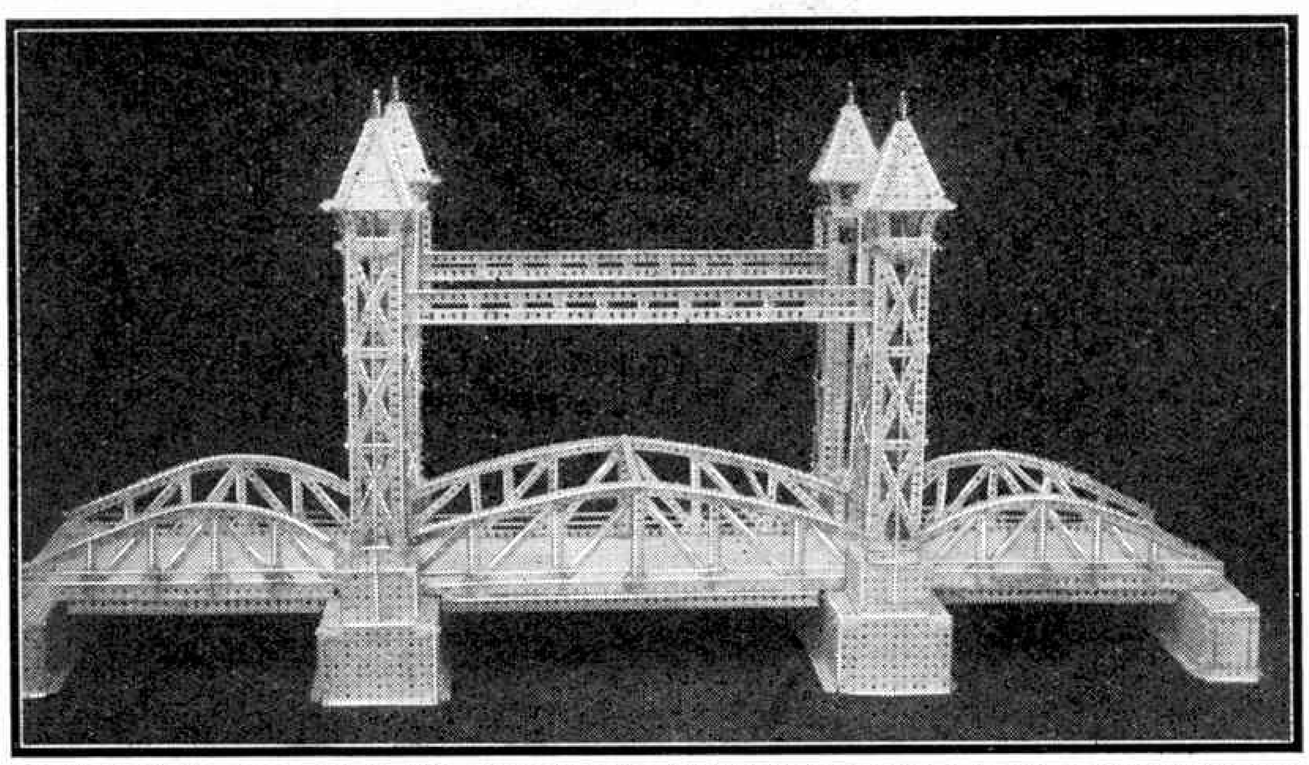
The entry of A. Gilissen, Holland, was a model railway bridge with a span of 6 ft. 6 in. Originally the bridge was built to complete the layout of the Hornby Branch of the Maastricht Meccano Club, of which Gilissen is a member. A notable feature is the great rigidity obtained by the use of only a few parts.

J. C. Diehl, Buenos Aires, won a prize with a model of a swinging bridge. The swinging portion of the roadway of the bridge is pivotally mounted at its centre on a pylon, which is supported by a pier and can swivel at right angles to the fixed section of the roadway to permit ships to pass on each side of it.

Another bridge of the lifting type was entered in the competition by D. Hofsommer, Holland. The model is well constructed, but unfortunately more attention has been given to the mechanical details than to the external appearance of the bridge, and this spoilt its chance of obtaining a higher award. The moving section of the roadway is raised and lowered by two Electric Motors concealed in the bases of towers at the ends of the approach roadways.

A fine model of a suspension bridge was also awarded a prize. The model was built by the boys of the Catholic Mission, T'ao-Nan, Manchoukuo, who are very keen model-builders. The bridge is strongly constructed, and in the photographs submitted it is shown spanning a small stream arranged outdoors. Other examples of the work of these boys are illustrated on page 671 of this issue.

The entry of D. Mullick is a model of the Forth Bridge, and although it is quite simple in construction, it reproduces faithfully the appearance and principal external details of its famous prototype.



Another of the successful models entered in the "Bridge" Competition. It won Second Prize for J. De Proft, Willebroeck, Belgium.

Prizewinners in "Lynx Eye" Contest No. 1

Home Section

1st Prize, Products value £2/2/–: G. Johnston, Southall. 2nd, Products value £1/1/–: R. Hughes, Llanbedrgoch, Anglesey. 3rd, Products value 10/6: C. Wrayford, Moretonhampstead, Devon.

Products value 5/–: J. Keeling, Hartlebury.

Overseas Section

1st Prize, Products value £2/2/–: J. Gnanadurai, Trichinopoly, India. 2nd, Products value £1/1/–: N. Rey, Mauritius. 3rd, Products value 10/6: A. Dionne, Montreal.

Products value 5/–: D. Murison, Buenos Aires; A. Abdulrahim, Karachi.

The Instructions Manual illustrations from which the 16 fragmentary pictures that appeared on page 358 of the June, 1937 "*M.M.*" were taken, are as follows: No. 1—Model H1, Steam Engine; No. 2—G66, Anti-Aircraft Gun; No. 3—K34, Box Ball Alley; No. 4—D10, Hammer; No. 5—K28, Beam Engine; No. 6—L1, Funicular Railway; No. 7—A7, Roman Balance; No. 8—B17, Hay Cart; No. 9—K15, Crane; No. 10—K19, Crane; No. 11—B120, Sideboard; No. 12—B86, Garden Seat; No. 13—K39, Engine; No. 14—B100, Rickshaw; No. 15—G58A, Submarine; No. 16—G59, Signal.

A Splendid Recruiting Scheme

Most Meccano clubs already know the value of Visitors' Nights, when parents and friends of members are able to see for themselves the good times that Meccano boys enjoy. Every club should make an effort to arrange meetings of this kind. These have the effect of arousing a desire on the part of visitors to become more closely associated with the good work. Many boys and young men actually join clubs as a result of an invitation to an open night, and older people who for various reasons cannot do this are gratified by requests to be allowed to enrol them as associate members. Such members pay a small subscription, say 2/6 or 5/– a year, and have the privilege of taking part in proceedings whenever they wish. They give valuable support on special occasions, and their influence is always of great benefit.

The Milan M.C. have worked out a novel scheme of this kind. They have formed what is called a "Sympathisers Branch" for young men and boys who for various reasons are not eligible for full membership. The members of this branch attend club meetings once a month and the committee's belief that this would be a preliminary step to full membership has been justified.

I heartily recommend this scheme to all clubs. It is a recruiting device of the very best kind, for the new members are given a preliminary taste of the pleasures of club life and in consequence become keen and enthusiastic.

More Correspondents Wanted

The response to my appeal in the July 1937 *"M.M."* for more members for the Correspondence Club has been excellent, but there are still many English members who wish to find friends in Canada, Africa, India, Australia, New Zealand and France. I should like more Meccano boys living in those parts of the world to join the Club. They will thoroughly enjoy correspondence with English boys of their own age and interests, and the exchange of stamps, postcards, or photographs.

There is one point I should like to make clear. An applicant from overseas is not simply placed in touch with the first English member on the list of those seeking a correspondent in his country. Great care is taken to introduce boys of roughly equivalent ages who have similar tastes and hobbies, and therefore are the most likely to form a lasting friendship. It is to the care taken in this respect that the great success of the Correspondence Club is due.

Guild members who have not yet joined the Correspondence Club should seriously consider doing so at once, for until they take this step they are undoubtedly missing an excellent opportunity of learning something of the interesting lives of boys in other countries. There is nothing more pleasant than to exchange news with someone living in a far-off part of the world, where conditions are utterly different, and there have been many instances in which correspondence has led to meetings, or to an exchange of visits that have confirmed the close friendship founded by correspondence.

Meccano Club Secretaries

No. 42. M. Thomson

M. Thomson has been the secretary of the Maylands (Western Australia) M.C. since its formation last year. In association with Mr. V. Malmgreen, the Leader, whose portrait appeared last month, he has played an important part in the rapid progress of the club.

Club Photographs

I wish to remind Leaders that I am always glad to reproduce group photographs, or portraits of officials or members with outstanding records to their credit. The appearance of photographs of the members, either in a group or at work in the club room, not only shows that a club is making good progress, but also gives great delight to the members who figure in it. This applies also to Branches of the Hornby Railway Company.

A straightforward group photograph is best for reproduction in the *"M.M."* Sometimes there is a desire to include large models of special excellence, and when these are included it is advisable to place them in such positions that they are not directly in front of the features of the members in the group. In all cases as plain a background as possible is best, for one full of unwanted details gives a confused effect.

Reports from Unaffiliated Clubs

Many new clubs have been formed during the past year, and the secretaries of some of them have written occasionally to tell me of the progress made. I am afraid there is a tendency among new clubs, however, to consider that as they have not yet obtained affiliation their work is not of sufficient interest to be included in *"Club Notes."* I assure them that they need not be diffident on that score, as I am keenly interested in unaffiliated clubs. All interesting club reports find their way into the Guild pages of the *"M.M.,"* and their appearance gives great delight to the members of the club concerned, and spurs them on to greater efforts. The reports published spread the news of the existence of the club and thus help to attract new members, and may even be helpful in securing the interest of a suitable Leader.

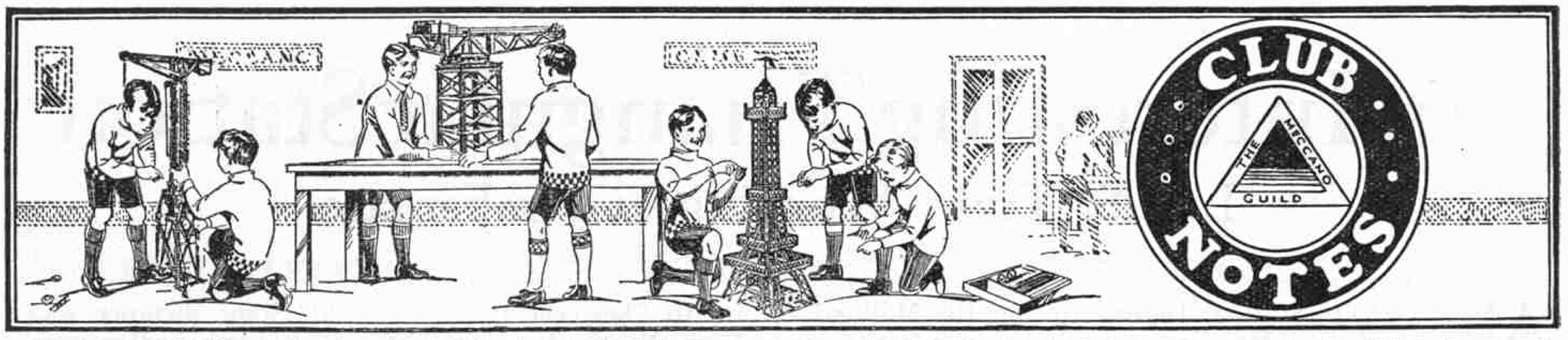
An Attractive Exhibition

The Islington M.C. are holding an Exhibition on Saturday, 27th November. This is being organised in association with the Islington Branch of the H.R.C., and will be held in St. Giles Mission Hall, Westbourne Road, Barnsbury, London, N.7. It will be open from 1 p.m. to 9.30 p.m., and all interested in Meccano model-building, miniature railway operations, and club work generally are cordially invited. The charges for admission are 6d. for adults, and 3d. for children. Parties of six or more will be admitted at half-price, children applying at the door before 3 p.m. will be admitted for 2d.

Proposed Clubs

Attempts are being made to establish Meccano Clubs in the following places, and boys interested should communicate with the promoters whose names and addresses are given below:

ARDROSSAN—J. McLeish, 25, Winton Street, Ardrossan.
BRADFORD—F. D. Rowan, 224, Toller Lane, Bradford.
CEYLON—C. H. J. Amaratunga, Ma Eliya Estate, Jaela, Ceylon.
LONDON—K. Brown, 156, Devonshire Street, Stepney, London, E.1.



Mount Senior Boys' School (Newark-on-Trent) M.C.—Membership has increased, and enthusiastic meetings are being held. Extensive model building is being carried out. An interesting visit has been paid to the L.M.S. Works at Derby, and arrangements are being made for a visit to Hull Docks. Club roll: 44. *Secretary:* E. Masding, Grove House, Lime Grove, Newark, Notts.

Coloured Mission (Cardiff) M.C.—An interesting programme is being carried out this session. The club stock of Meccano has been increased, and model-building, on a larger scale than previously, is the chief occupation of the members. Club roll: 10. *Secretary:* David H. Binstead, 37, Penhill Road, Llandaff, Cardiff.

Middlesbrough M.C.—Attendance is steadily increasing. Model-building activities have chiefly taken the form of interesting club Contests, and these have attracted excellent entries. Table Tennis is a favourite pastime of the members. Club roll: 30. *Secretary:* I. Stewart, 59, Kildare Street, Middlesbrough.

Bryntirion M.C.—Plans are being made for an Exhibition. Games are very popular, and include billiards, chess and ping-pong. Club roll: 14. *Secretary:* P. Parry, Ar-y-bryn, Penllwyn Park, Carmarthen.

Exeter M.C.—Model-building has engaged the attention of the members at recent meetings. As usual an excellent variety of subjects have been reproduced in miniature, and recent models completed have included windmills, ships, bridges, excavators, a crane and a traction engine. The chief diversion of members has been Darts. Club roll: 22. *Secretary:* A. J. Hancock, 237, Monks Road, Exeter.

Great Baddow M.C.—Full advantage was taken of the summer weather last session, and all outdoor meetings were well attended. A Treasure Hunt across the local countryside, in which the clues were hidden in gateposts, stiles, and similar places, was a great success. A Cricket Match between teams led by the secretary and storekeeper ended in a victory for the former by only four runs, after a very thrilling finish. An Object Hunt has been held, at the start of which the members were given a list of unusual objects, and then hunted until these were found. Points were awarded for the first team home, and also for the finding of the correct objects. Club roll: 21. *Secretary:* K. J. Avis, 5, Crescent Road, Great Baddow, Chelmsford.

Some of the members of the Christchurch and Ashburton clubs on the occasion of a joint excursion to Timaru. Mr. J. Ancall, Leader of the Christchurch M.C., is second from the right. These two flourishing New Zealand clubs have their headquarters 50 miles apart, but regularly exchange visits.

Old Charlton M.C.—At one meeting the ever-popular two-minute talks were given. Marks were awarded to members taking part, and added to those earned for model-building. The member who obtains the highest number of marks during the session will be awarded a cash prize. On another occasion a novel "Hunt" was held. Several rhymes giving clues to well-known streets or buildings in the vicinity of Charlton were read, and the members had to identify the references. Club roll: 22. *Secretary:* K. L. Morphew, 221, Westcombe Hill, Blackheath.

Wednesbury M.C.—Separate meetings for Juniors and Seniors are now being tried, and if the arrangement works well it will probably become permanent. Model-building activities continue, and Games Evenings are held regularly. On one occasion a member brought a Table Tennis outfit; another contributed a dart board, and a third a pitching board. Film shows and Lectures are being arranged. Club roll: 24. *Secretary:* A. L. Morgan, 17, Cobden Street, Fallings Heath, Wednesbury.

Hornsea M.C.—Great interest is being taken in Meccano model-building, and two excellent motor lorries have been constructed. One evening each month has been devoted to a Hornby Railway session occupying three hours. Boat races have been held on Hornsea Mere. The Senior Engineers won the first race by one length, and the Junior Scientists the second one by four lengths. The Apprentices recently scored a victory over the Junior Scientists during a game of bowls. A visit has been paid to the newly-excavated Roman remains at Brough and Pickering Park Museum, and some enjoyable cycle rides also have been held. Club roll: 19. *Secretary:* P. Thom, 5, Alexandra Road, Hornsea.

Islington M.C.—The Meccano Section now hold their meetings on Friday nights, and the Hornby Section on Monday nights. The members of the latter Section only attend the Meccano meetings when invited to the monthly Open Night. Members are busy working for an Exhibition. Club roll: 13. *Secretary:* A. D. Straker, 42, Onslow Gardens, Muswell Hill, N.1.

Folkestone M.C.—Recent activities have been concerned chiefly with the Hornby layout, and some realistic operations have been carried out. A visit has been paid to Folkestone Harbour, where during a two-hour stay the party saw three fine steamships, and witnessed also the departure of six express trains conveying passengers from the ships to London. Club roll: 7. *Secretary:* W. F. Cotter, 72, Dover Street, Folkestone.

Breich M.C.—Meetings are now held in the Welfare Hall, and the club are readily assisted by the Hall officials. Some interesting Lantern Lectures have been given. During the summer an excursion to Edinburgh was greatly enjoyed, members visiting both the Castle and the Museum there. Club roll: 10. *Secretary:* M. Anderson, 36, Breich Terrace, West Calder.

Sid Vale M.C.—During the Winter Session meetings are being held weekly, and an interesting programme is being carried out. A ramble to Leak Hill and Muttermoor in charge of the President was much enjoyed. Games were played while on the top of the moor. Club roll: 20. *Secretary:* L. R. I. Gliddon, Sheffield House, Sidmouth.

Winchmore Hill Collegiate School M.C.—The present session began with the election of a new committee, and plans were drawn up for the Annual Exhibition, which it is hoped to hold early in December. Members are now engaged in constructing models for the event, and also a variety of handicrafts for sale at the Exhibition. Another attraction will be a variety show. Club roll: 31. *Secretary:* J. A. Piejus, 22, Woodland Way, Winchmore Hill, London, N.21.

St. Stephens (Saltash) M.C.—There has been an increase in the membership of the Model-building Section. The large models of Gatwick Airport and Millbay Station are practically completed, and work on the D.H. "Dragonfly" aeroplane and the racing yacht "*Shamrock*" is making good progress. The keel has been laid of a 3 ft. model of the M.V. "*Stirling Castle*." Club roll: 16. *Secretary:* B. Braund, 9, Homer Park, Saltash.

Bridport Grammar School M.C.—The Meccano Section is especially popular. Considerable use is made of members' capabilities in the construction of scientific models for demonstration during the school mechanics lessons. Club roll: 34. *Secretary:* Mr. M. F. Tighe, 39, Andrew's Road, Bridport.

AUSTRALIA

Maylands M.C.—Model-building is being carried on most enthusiastically, and all models are now built to a fixed schedule. The several Factions of the club have been busy preparing for an Exhibition. At one meeting each Faction presented an hour's programme. The Red and Blue Faction introduced brief discussions on various topics, a feature new to the club. An Aeroplane Competition has been held to discover well-made aircraft built by members, so that these could be photographed for use in future model Aeroplane Exhibitions. Club roll: 31. *Secretary:* H. Thomson, 13, Kennedy Street, Maylands, Western Australia.

Melbourne M.C.—A visit was paid to the Hobbies Exhibition at Brunswick Technical School. The exhibits included 22 Meccano models, and prizes were awarded for a fire escape and a motor wagon. At one meeting a Meccano elliptical lathe was demonstrated, and on another occasion Meccano models of a pile driver and a crane were brought by two members for inspection. Visits also have been paid to the "O" Gauge electric railway of Mr. P. Phillips, of St. Hilda, and to the wonderful remote-controlled "O" Gauge railway of Mr. Eadie, of Richmond. In both instances members saw much that was of the greatest interest. Realistic operations have been carried out on the club's Hornby Train layout. At one meeting an interesting effect was obtained by running several trains simultaneously while the room was in darkness, and depending upon the new illuminated track diagram to indicate the position of trains. A feature of the Hornby activities of this club is the carrying out of train schedules devised by the members. Club roll: 10. *Secretary:* L. Ison, 8, Hayes Street, Northcote, N.16, Victoria.

Thebarton Technical School M.C.—A Lecture by a Senior member on the "*Solar System*" was much enjoyed. A sequel to it was an evening visit to the Adelaide Observatory, where members examined the many clocks and recording instruments, and spent hours in observing the planets through the large telescope. The guides were so surprised at the keen interest of the members that they presented each one with a generous supply of literature on astronomy. A particularly interesting Lecture by a Senior member on "*The Life in One Drop of Water*" was illustrated with the aid of an epidiascope. Club roll: 75. *Secretary:* B. S. Clarke, 1, Laurel Avenue, Linden Gardens, South Australia.

EGYPT

Zagazig M.C.—A special sight-seeing tour in Cairo was arranged during the celebrations for the coronation of King Farouk. The city was gaily decorated, and the tour was greatly enjoyed. A visit by camel has been paid to the Giza Pyramids, and a motor car tour included visits to the two chief Coptic Churches, the Mosque of Amr, and the wonderful Egyptian Museum. Indoor activities have included the construction of travelling and swivelling cranes, and a Social and Games Evening. Club roll: 22. *Secretary:* Miss B. Mangourie, 39B, Sharia El Sikka El-Hadid Avenue, Zagazig.

ITALY

Milan M.C.—Important additions have been made to the club stock of Meccano, and members are now able to build larger and more complicated models. The Library also has been increased, and now includes 220 books in addition to 12 magazines for which the club subscribes. The Photo-Chemico-Electric Section are continuing their interesting experiments, and it is hoped to purchase additional equipment shortly. A very interesting Lecture on "*Automobiles 50 Years Hence*" was given recently by the President. An outing to Lake Lugano was greatly enjoyed. Club roll: 14. *Secretary:* Enrico Vigo, Corso Genova 19, Milan.

SOUTH AFRICA

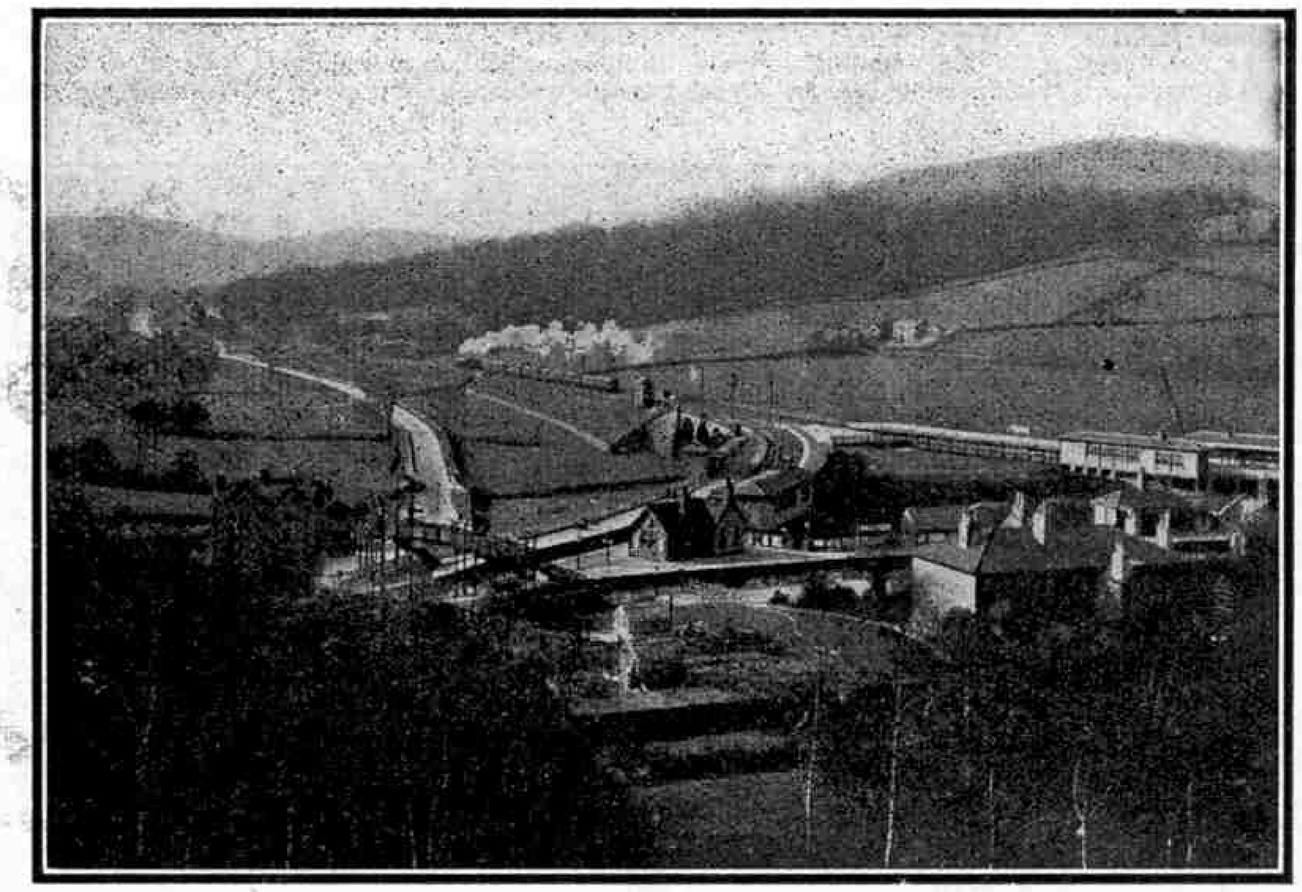
Southern (Capetown) M.C.—A Visitor's Evening, for which a special programme was arranged, was a great success, and the fine models of cranes, buses and aeroplanes built for the occasion were much appreciated. The junior members are to build a motor chassis. The parents of members were invited to a Lecture by the President on "*Modern Inventions*," and this was much enjoyed. On a visit to the Capetown Airport, sketches were made and photographs taken of the aeroplanes seen, and models of these machines have since been built by the members. *Leader:* Mr. R. H. Moodley, 10, Stirling Street, Capetown, Cape Province.

An Interesting Triangular Station

L.M.S. Train Working at Ambergate

AMBERGATE Station, Derbyshire, on the Midland Division of the L.M.S., is unusual in having platforms serving each of the three sides of a triangular junction layout. On the inside of the triangle the platforms are continuous, and as each of the three lines is composed of double track there is a corresponding outer platform on each side. This unusual layout makes Ambergate very fascinating from the traffic point of view. Further interest is added by the fact that there is an alternative route to one side of the triangle. This does not serve the station platforms, but passes by at a little distance from them and is carried through a short tunnel in doing so.

Approaching Ambergate from Derby and the South there is a stretch of four-road track, which at Ambergate South Junction resolves itself into two distinct routes. That bearing to the right forms the station-avoiding line previously referred to, and passes through the short Toadmoor Tunnel. It was the original main line of the old North Midland Railway, one of the original constituents that amalgamated in 1844 to form the Midland Railway. The other route leads to Station Junction, which forms the southerly apex of the triangular station layout. There the line for Rowsley and Manchester turns sharply to the left. This is the curved line that is seen in the centre of the illustration on this page, and the sharpness of the curve between the station platforms necessitates a permanent speed restriction to 15 m.p.h.



An interesting view of part of the Ambergate triangle described on this page, showing the Station and West Junctions. The train seen in this illustration is taking the route to Rowsley and Manchester, and has just passed the signal box at West Junction.

This line is used by the Manchester and St. Pancras expresses of the Midland Division of the L.M.S., and leaves the station via West Junction. The signal box controlling this Junction is visible in the illustration, in which it is just to the rear of the train on the Manchester route. From Ambergate the line passes on to Rowsley, a section that originally formed part of a scheme to connect Ambergate with Stockport. It was opened in 1849 and worked by the Midland, but was leased three years later to the London and North Western and Midland Railways. In 1871, however, the Midland obtained full possession.

The right-hand route at Station Junction also is curving, and a connecting line from West Junction joins it at North Junction, thus completing the three sides of this interesting triangular layout. Just beyond this junction it is rejoined by the avoiding line through Toadmoor Tunnel, and the right-hand route then leads on to Chesterfield and Sheffield. Some distance away from North Junction there is a further divergence, again to the right, at Crich Junction, where a line goes off to Codnor Park and Nottingham.

Each of the five junctions, South, Station, West, North and Crich, has its own signal box. With so many routes available the area is a busy one. Ambergate is in fact such a "focal point" for traffic that the North Junction box forms a reporting point for train control purposes, and from it all movements of traffic in the area, even those that do not directly concern North Junction, are communicated to the Control Office. The work of the South Junction box men also is important, for this junction is the diverging point for traffic between Derby and Manchester on the one hand, and between Derby and Sheffield on the other.

The trains between St. Pancras and Manchester traverse the South, Station and West Junctions, and the same junctions deal also with a vast amount of freight traffic between Chaddesden sidings at Derby and Rowsley sidings. There are also freight movements between Rowsley and Toton sidings, near Nottingham, which follow the Codnor Park route and so use the West, North and Crich Junctions. Nottingham and Manchester trains also travel this way, and in summer it is the route for numerous special trains from the Midland Districts to Blackpool.

The platform roads on the eastern curve between Station and North Junctions are necessarily used by trains such as those between Derby and Sheffield that require to call at Ambergate. The Toadmoor Tunnel avoiding line, however, is used by through North and West expresses, such as *"The Devonian"* between Bradford, Leeds and the West of England via Derby and Bristol. Through freight trains also make use of this avoiding line. The tunnel itself is of unusual shape. It is elliptical in section, and has the appearance of having been flattened on top.

At one time some of the Midland trains from London to Manchester actually used the north side of the Ambergate triangle. They travelled via Nottingham instead of Derby, and reached Ambergate by way of Codnor Park, passing over by way of Crich and North Junctions before joining the Derby and Manchester route at West Junction.

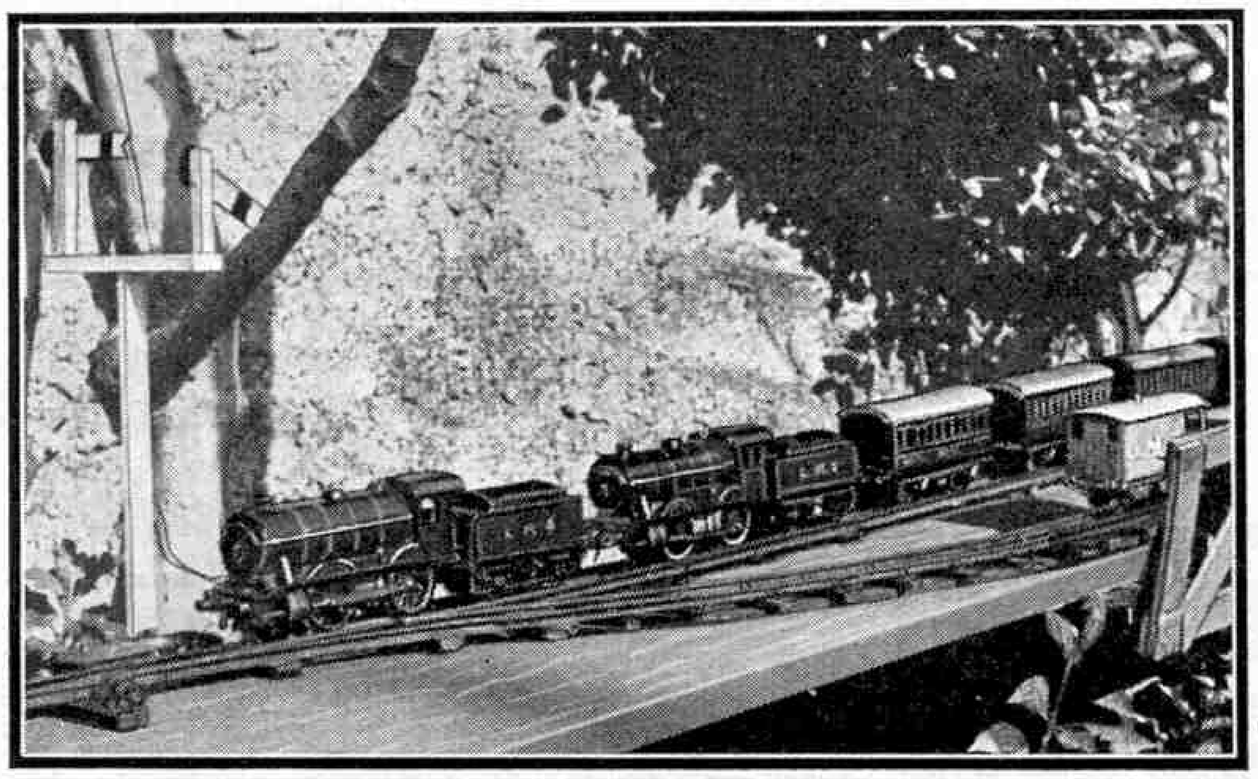
Extending a Hornby Railway

Brisker Running on a North Wales Layout

WE have previously given descriptions and reproduced photographs of the outdoor layout of Mr. J. Southwell and his two sons, of Holyhead, all of whom are enthusiastic members of the H.R.C. The layout is continually being developed and improved, and on this page we reproduce a photograph of it in its present form. It is non-continuous, and the operations carried out on it are based on the actual services of the L.M.S. between Euston and Holyhead. Branches serve separate terminal stations at "Liverpool," "Manchester" and "Swansea." "Shrewsbury" also plays an important part in the system, and for reasons of space and convenience it is placed between "Stafford" and "Crewe" Stations.

The system is in continuous operation from April to October each year. During the winter months it is dismantled and any reconstruction work that may be necessary is carried out. The running season closed at the end of last month, and this is an appropriate time to review the latest developments.

Extensive track and station alterations carried out during last winter have made it possible to operate greatly improved services. Shrewsbury station has been entirely rebuilt. It has now five platforms, three of which are 8 ft. 6 in. long; in addition there are two bays which are 4 ft. 6 in. long. All the station offices and buildings are concentrated on one platform. These include booking offices, refreshment rooms, waiting rooms and a bookstall.



An interesting view on the layout of Mr. J. Southwell, of Holyhead, H.R.C. No. 43323. The train represented is the "Irish Mail," and it is hauled by two No. 1 Special Locomotiver

Improvements also have been made to Holyhead Station, which has been completely rebuilt in order to represent fairly accurately the layout of the real station. There are two covered platforms, each 9 ft. in length, one being on each side of the harbour, as in actual practice. The baseboard between the quays has been painted blue to represent the water, and on it are specially constructed models of the L.M.S. mail steamers "*Hibernia*" and "*Cambria*."

Crewe Station has been enlarged by the addition of a third platform. All three platforms are covered in, and each is 7 ft. long. There are two main line platforms, and the third one is used for branch line connections and local trains to Shrewsbury and Manchester.

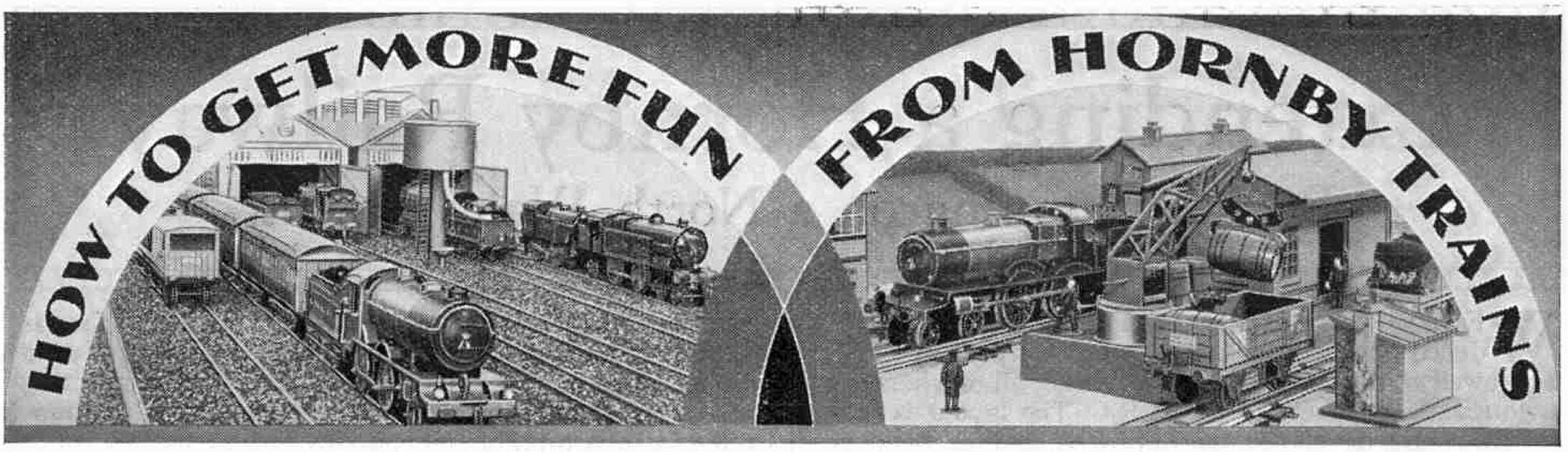
As a result of these "engineering operations" the traffic capacity of the line has been increased. Four different kinds of services are run, representing respectively the Winter and Summer week-day services and the corresponding Sunday services for both seasons. For each kind of service there are various different groups of workings, which form what the owners describe as "episodes." An episode consists of the complete operation of one or more main line trains, together with connecting trains and through coach services. Prior to the alterations referred to, a total of 100 episodes with about 800 trains were run during the course of an operating season. This year it has become possible to increase the number of episodes to 130, and the number of trains run to over 1,000!

Very careful preparation is necessary when planning services on such a scale, and complete working timetables therefore are devised for the whole of the season. From these it is possible to tell the position of every locomotive and piece of rolling stock at any given time throughout the whole of the period! The completed timetables and working arrangements are set down in a notebook, which is a very useful record and guide when the arrangements for another season are put in hand.

Chief reliance for motive power is placed on Hornby clockwork locomotives, and two No. 3C "Royal Scots" undertake the hardest duties. This is very appropriate in view of the employment of the "Royal Scots" on the "*Irish Mails*" of real practice. The Hornby "Scots" are well supported by two No. 1 Special Locomotives, which represent the numerous real L.M.S. engines of class "5X." A favourite arrangement with very heavy trains is to use the two No. 1 Specials together, and the photograph on this page shows this practice in operation. Other engines include a No. 0 Tender Locomotive and various Hornby Tanks ranging from a No. 2 Special to one of the M3 type. The Tank Locomotives are of course particularly useful for operating the various branch and connecting services that form an important feature of the working of the line.

For the passenger train services extensive use is made of Hornby No. 1 Coaches and Guard's Vans, short four-wheeled vehicles fitting in better with the general scheme of things than bogie stock, and allowing a greater number of through coaches to be worked. An interesting development in connection with the mail services has been the repainting of two of these No. 1 vehicles to represent mail stowage vans.

Freight services also are run, and their working is made to dovetail into the passenger arrangements in a realistic manner. The planning of suitable paths for these trains and the provision of suitable engines for all of them cannot be a task to be undertaken lightly, but Mr. Southwell and his colleagues have evidently reduced this sort of thing to a fine art!



GETTING READY FOR WINTER TRAFFIC

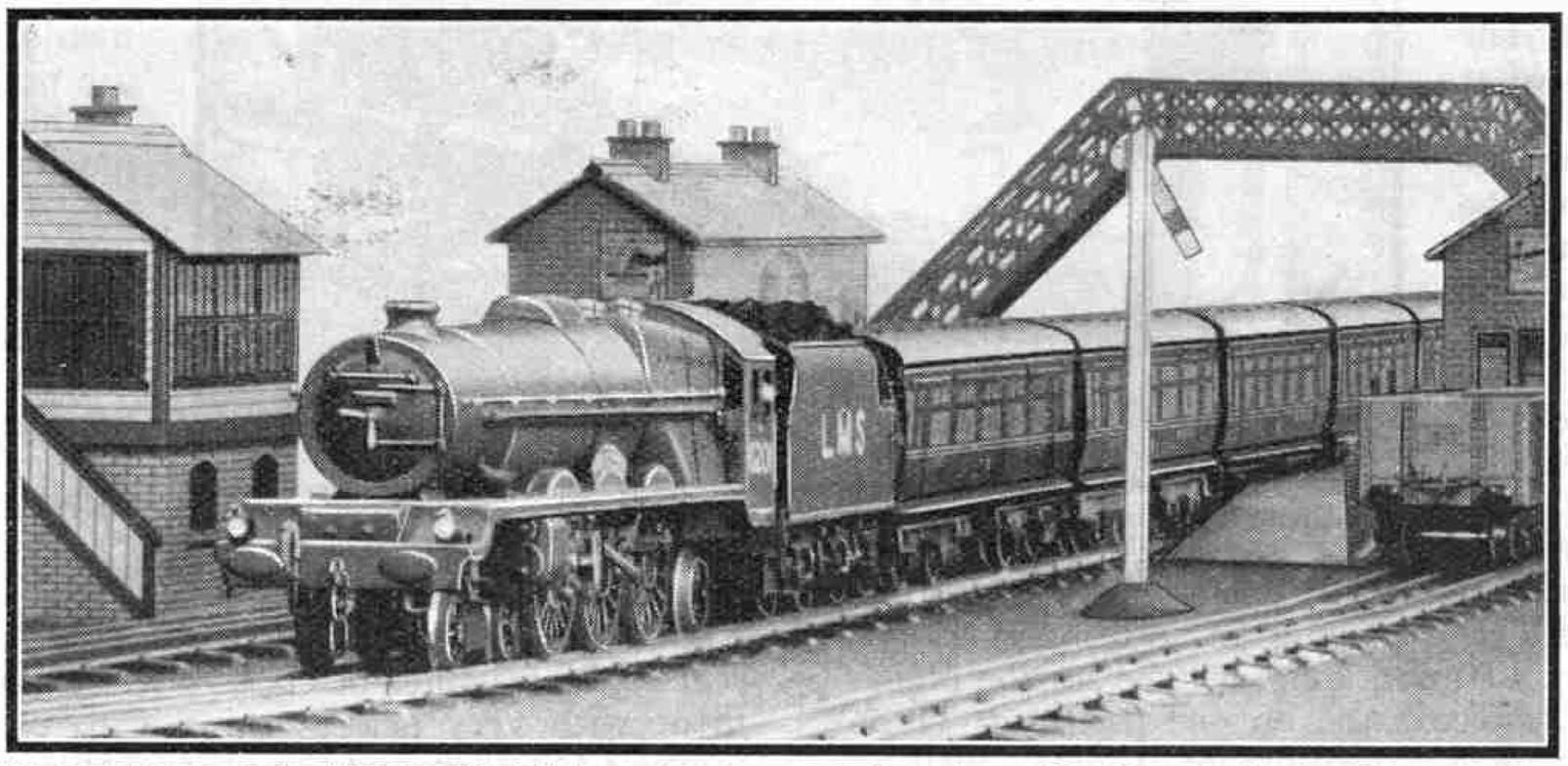
THIS time of the year is a very busy one on miniature railways, for it is now that extensions usually are planned and improvements made to allow the running of better or more intensive services. Before putting these in hand, however, it is advisable to overhaul the existing equipment in order to make sure that it will give satisfaction in the work ahead. A little attention now may save much disappointment and annoyance when the winter running programme commences.

The track must be in good order if successful operations are to be carried out, and the rails therefore should be carefully examined. On a permanent layout this inspection is easily made. The track probably will not require any adjustment of level, but should be tested to see that it is correct to gauge. This can be done on an electric layout by means of the combined Rail Gauge, Screwdriver and Spanner that is packed with all Hornby Electric Locomotives. On clockwork railways the winding key handle of Hornby Clockwork Locomotives forms a rail gauge for the track. On sliding either of these along between the rails of Hornby Track, defective places are detected immediately, and the rails should be eased apart gently where they may be tight. A layout that is only put down when required should be tested in a similar manner. It is best to lay down the rails to form a track, for it is much easier and quicker to examine rails and other track components in position than to test them separately.

The laying down of the line in this manner will show up any loss of the connecting pins fitted at the ends of the rails. Those that are loose should be tightened up by pinching the rail head carefully with a pair of pliers, and missing pins should be replaced before running begins. The pins can be obtained separately, and temporary or haphazard substitutes should not be used as they are very unsatisfactory.

The rail heads that receive the pins also should be inspected, for the frequent putting together and taking apart of the track of portable layouts is liable to cause them to open out. They should be closed up carefully with a small pair of pliers, a spare pin being inserted in the rail head while the pliers are being used. There is then no difficulty in restoring the rail ends to their original shape with holes of the correct size for the pins.

Rails that have been out of use for some time probably will be dirty. Their heads may show traces of a black deposit of a mixture of oil and dust picked up by the wheels during service. This also may collect on the wheel treads of engines and rolling stock, and if allowed to become excessive causes very "woolly" and unsatisfactory running. It is easily removed from the rails and the wheels by wiping them with a rag that has been dipped in a very small quantity of petrol, and the improvement in running that will follow makes this really worth while. The petrol must not be used near a fire or flame.



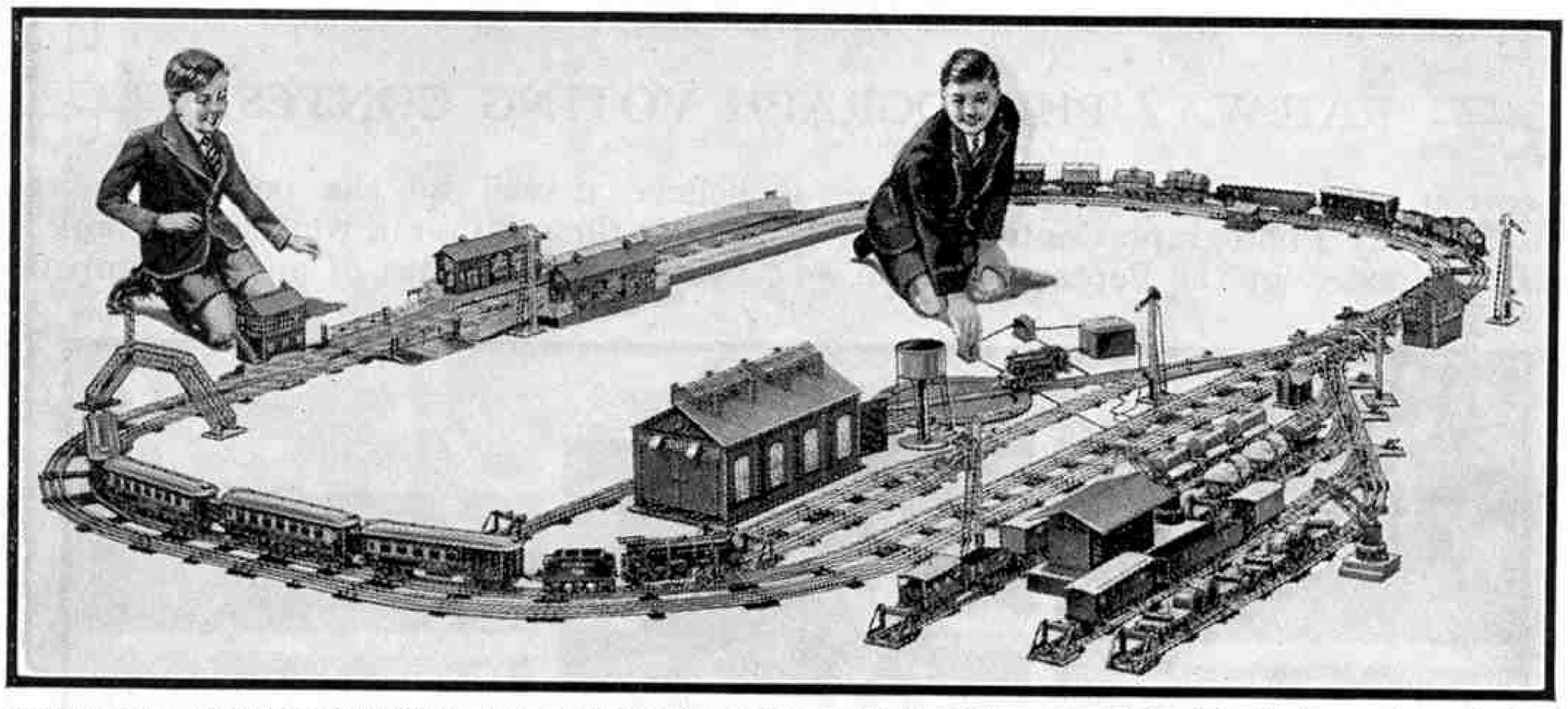
The Hornby Locomotive "Princess Elizabeth" on a heavy express train made up of No. 2 Corridor Coaches. The appearance of this train is typical of that of many L.M.S. expresses of real practice.

Special attention should be given to the mechanical portions of points, such as the switch rail units and points levers. Care should be taken to see that the switch rails are in correct alignment with the fixed rails, whichever way the points are thrown. Sometimes a little setting with a pair of pliers is necessary in order to make the points just right for smooth running.

Crossings can scarcely get out of order, but it is just as well to look them over at the same time as the rest of the rails. In particular the rail ends should be examined and, if necessary, dealt with in the manner already described. Buffer Stops and other accessories that are connected to the track should be examined and cleaned at the same time. Cleaning accessories usually means simply dusting them, and for this purpose an ordinary paint brush of the "mop" variety, is very useful. It can reach into corners where a rag cannot penetrate, and a more satisfactory job is the result.

The connections from the power supply to the track should be examined, and any loose contacts tightened.

Plug connections that may have become loose in their sockets can be adjusted by placing the blade of a penknife, or a thin screwdriver, in the slot in the plug in order to separate slightly the two sections of the fitting. Connections that are made by means of terminals, such as those on electrically-illuminated accessories, should be examined and tightened up if necessary. Terminal Connecting Plates or Combined Switch Rails may require new fuses. It is important that the fuse wire specified in the instructions packed with each Hornby Electric Locomotive and each Meccano Transformer should be used.



Fine fun on a Hornby layout! Before commencing regular operations for the winter season it is advisable to examine and attend to the various components of the layout as described in this article.

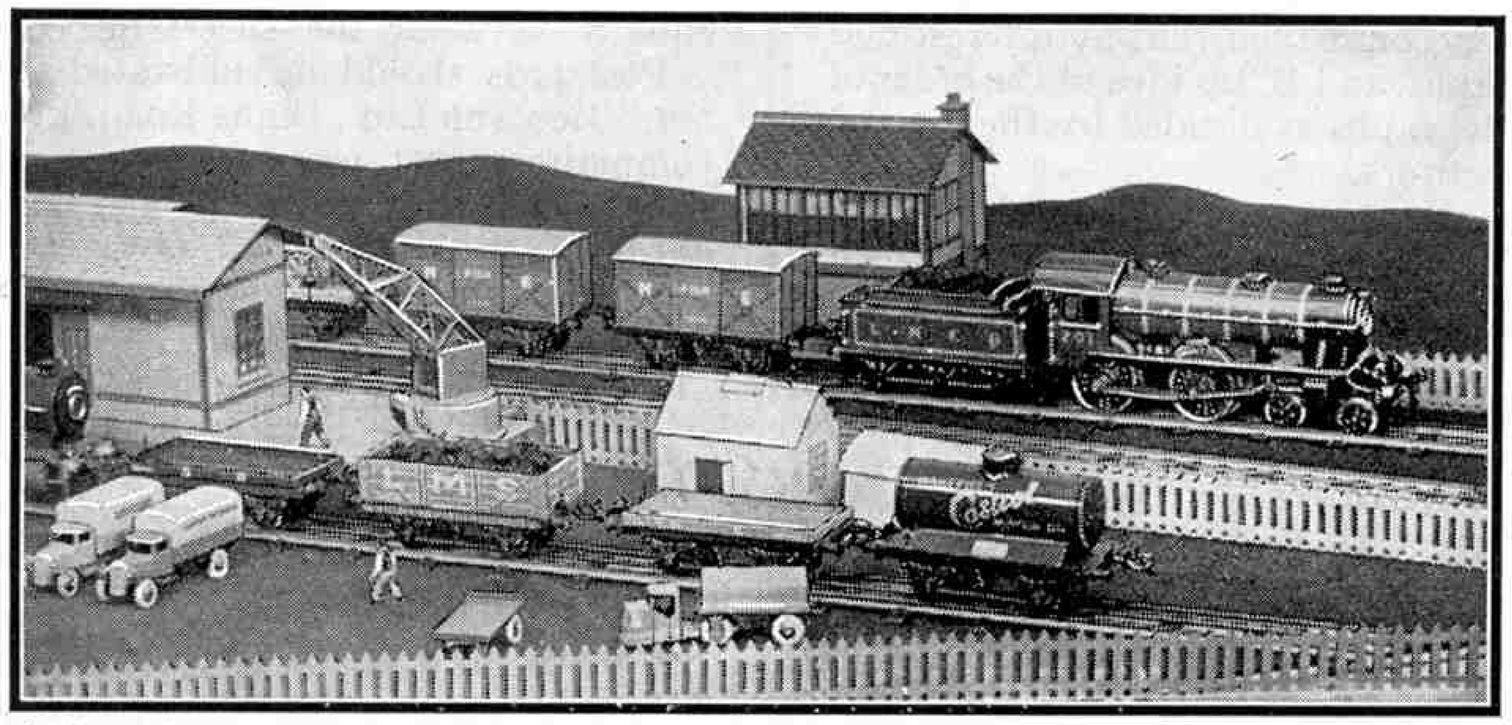
Once the track and its accessories are in order, attention can be devoted to the engines and rolling stock. Electric locomotives should be given a good general examination and particular attention should be paid to the wheel treads and collector shoes. If these have any black deposit on them they should be cleansed with petrol, as already explained. It is not advisable to interfere with the brushes of the motors, but the commutator should be cleaned in the manner described in the locomotive instruction leaflets, that is by passing a piece of fine emery paper rolled round a matchstick through the hole provided for the purpose in the brush gear side plate. The emery paper is allowed to bear on the commutator while the wheels of the engine are turned by hand.

Particular care should be taken with the lubrication of the moving parts of the engines. An excess of oil is to be avoided, as this finds its way on to the wheels and other places where it is not wanted. If any repairs or renewals are necessary the locomotives should be sent to the Service Department at Meccano Ltd., full details of the defects accompanying each engine.

The mechanism of a clockwork locomotive should be washed out with petrol in order to remove any old oil that may be in it, together with accumulated dust that would tend to prevent the free working of the engine. This should be done out of doors, and away from fires or flames. The petrol can be introduced into the mechanism from a small oilcan kept specially for the purpose, and it is a good plan to use a small paint brush to assist the cleaning operation. When all dirt has been removed the engine should be allowed to stand until the petrol has evaporated, leaving the mechanism clean and dry. Light lubrication of the various spindles, bearings and gear wheels with Meccano oil should then be undertaken. The use of too thick an oil is a frequent cause of sluggish running. Meccano Graphite Grease can be applied with advantage between the coils of the spring.

The cleaning and examination of tenders and rolling stock is equally important if the best results are to be obtained. A little cleaning here, a little adjustment there, or a spot of Meccano Oil or Graphite Grease on the bearings frequently works wonders with a wagon or coach that does not move easily. Sometimes it is necessary to remove the wheels to get rid of dust or fluff that may have collected between them and the axle-guards or bogie frames. The petrol rag should again be used here, and the axles and wheel treads can be cleaned up at the same time. Those vehicles that are fitted with axle-boxes should have the supply of Graphite Grease in them renewed before the wheels are replaced in position.

Some of the couplings of various vehicles may want a little attention. They may not be moving freely on their pivots. Sometimes couplings get bent slightly, so that they are forced against the buffer beam, and this causes them to be stiff. The couplings of all stock should be examined and any slight adjustments carried out. The satisfactory engagement of the automatic couplings depends a great deal on their freedom of movement and on their correct adjustment. They should be straight, and any that are bent up or down, owing to "rough shunts" or other causes, should be straightened out with a small pair of pliers.



An interesting goods yard scene with a fast freight train passing through on the main line. The various Dinky Toy Components in the foreground add considerably to the realism of the layout.

The examination, cleaning and adjustment of accessories is as important as that of rolling stock if the system is to be smart and efficient. For instance, the working parts of Signals, particularly of those that may be operated by means of the Hornby Control System, must be correctly adjusted. The slightest drop of oil applied to these or to such parts as the Control Lever Frame makes a big difference to the ease of operation.

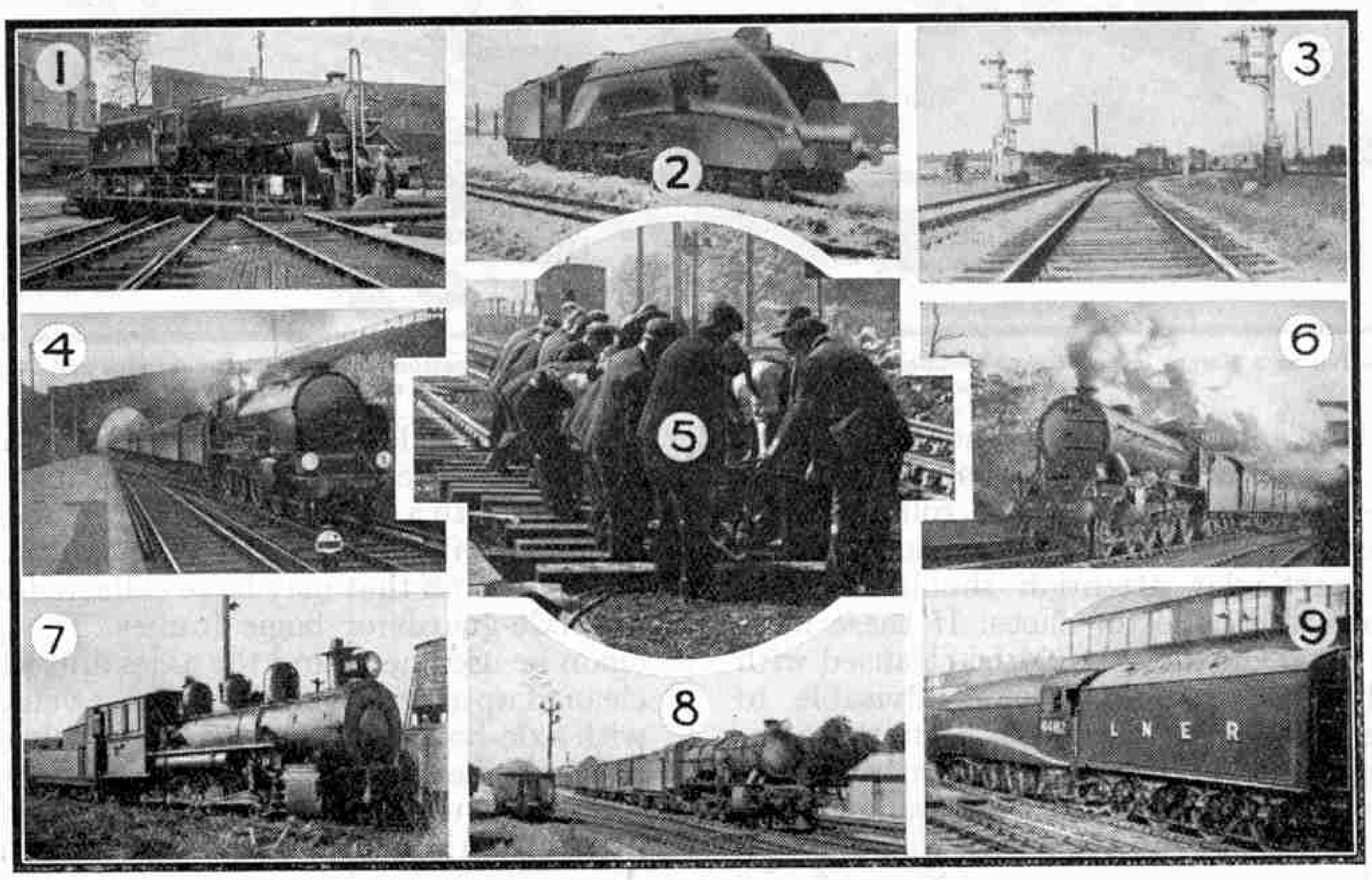
Join the Hornby Railway Company and become eligible for the competitions announced on this page.

H.R.C. COMPETITION PAGE

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

RAILWAY PHOTOGRAPH VOTING CONTEST

Many splendid entries were sent in by members in the Summer Series of "Railway Photograph Contests," the last of which was announced in the September issue. Several have already been reproduced on the "Railway News" pages of the "*M.M.*," and on this page we give nine others, all of which won prizes. These nine photographs form the basis of an interesting competition in which every member can take part.



Each competitor is asked to state on a postcard A, the photograph he likes best of all, taking into account their railway interest and their merit as photographs, and B, his idea of the order of popularity of the photographs as decided by the massed votes of all the competitors.

Competitors should denote each photograph by the number marked on it. Entrants need not place their own favourite photograph at the head of list B, unless they believe it will be the popular choice. They should give it the position in which they think it will be placed by the massed votes of all the competitors.

There are two sections in the contest, for Home and Overseas members respectively, and in each three prizes consisting of any products manufactured by Meccano Ltd. to the values of 21/–, 15/– and 10/6 will be awarded. In addition there will be several consolation prizes, and in the event of a tie for any award this will be divided equally between the successful competitors.

Postcards should be addressed "*H.R.C. Voting Contest*," Meccano Ltd., Binns Road, Liverpool, 13, and each competitor must write his name, address and H.R.C. membership number at the end of his list. The closing dates in the Home and Overseas Sections are 30th November and 28th February, 1938, respectively.

Layout Planning Contest

In this contest we are asking members to submit designs for layouts based on a main-line oval, of either double or single track. Two terminal stations, sidings and any other features necessary to make a model railway for passenger and goods traffic practicable and interesting may be added, but the maximum space allowed is 15 ft. long and 10 ft. wide. In order to give competitors free scope for designing useful layouts no cost restrictions are imposed.

Scale drawings are preferable for this purpose; and a scale of one inch to one foot is a convenient one; but members who do not care to make such drawings should indicate the position of each rail by short cross lines, in the same way as is done in the booklet "Hornby Layouts—100 Suggestions." Entries will be judged on their realism and on their possibilities for railway working.

The contest will be divided into the usual two sections, Home and Overseas, and in each will be awarded prizes consisting of any products manufactured by Meccano Ltd., to the values of 21/–, 15/– and 10/6. Entries must be addressed "*H.R.C. November Layout Planning Contest*," Meccano Ltd., Binns Road, Liverpool 13, and the closing dates in the Home and Overseas Sections are 30th November and 28th February, 1938, respectively. Each competitor's name, address and H.R.C. number must be written on the back of his entry.

COMPETITION SOLUTION

"July Missing Links Contest"

"*Sir Frederick Harrison*," 5531, 4–6–0, "Patriot," L.M.S.; "*Dumbleton Hall*," 4920, 4–6–0, "Hall," G.W.R.; "*Dunraven Castle*," 4092, 4–6–0, "Castle," G.W.R.; "*Sir Sam Fay*," 5423, 4–6–0, "Sir Sam Fay, B2," L.N.E.R.; "*Glasgow Yeomanry*," 5158, 4–6–0, "5P5F Standard Mixed Traffic," L.M.S.; "*Sir John Hawkins*," 865, 4–6–0, "Lord Nelson," S.R.; "*Quicksilver*," 2510, 4–6–2, "A4," L.N.E.R., or "*Quicksilver*," 31073, Railcar, L.N.E.R.; "*Nyasaland*," 5622, 4–6–0, "Jubilee," L.M.S.; "*Cranleigh*," 936, 4–4–0 "Schools, V," S.R.; "*Merlin*," 4486, 4–6–2, "A4," L.N.E.R., or "*Merlin*," 740, 4–6–0, "King Arthur, N15," S.R., or "*Merlin*," 3259, 4–4–0, "Duke," G.W.R., or "*Merlin*," 85, 4–4–0, "V," G.N.R.(I); "*Selkirkshire*," 2756, 4–4–0, "Shire, D49," L.N.E.R.; "*The Staintondale*," 376, 4–4–0, "Hunt, D49," L.N.E.R.; "*Moor Hen*," 25371, 4–4–0, "George the Fifth," L.M.S., or "*Mons Meg*," 2004, 2–8–2, "Cock o' the North, P2," L.N.E.R.; "*Loch Rannoch*," 4698, 2–6–0, "K2," L.N.E.R.; "*Lady Patricia*," 6210, 4–6–2, "Princess Royal," L.M.S.; "*Broughton Grange*," 6805, 4–6–0, "Grange," G.W.R., or "*Broughton Castle*," 5033, 4–6–0, "Castle," G.W.R.; "*Queen Guinevere*," 454, 4–6–0, "King Arthur, N15," S.R.; "*The Dougal Cratur*," 9400, 4–4–0, "Scott, D30," L.N.E.R.; "*West Ham United*," 2872, 4–6–0, "Sandringham, B17," L.N.E.R.; "*Henry Oakley*," 3990, 4–4–2, "C2," L.N.E.R.; "*Ballindalloch Castle*," 14676, 4–6–0, "Castle, H.R.," L.M.S.; "*St. Johnstoun*," 9901, 4–4–2, "C11," L.N.E.R.; "*Dugald Dalgetty*," 9414, 4–4–0, "Scott, D30," L.N.E.R.; "*Hackworth*," 2328, 4–6–0, "Remembrance, N15X," S.R.; "*Cefntilla Court*," 2936, 4–6–0, "Saint," G.W.R.; "*Viscount Churchill*," 111, 4–6–0, "Castle," G.W.R.; "*Prince Henry*," 5429, 4–4–0, "Director, D10," L.N.E.R., or "*Prince Henry*," 4043, 4–6–0, "Star," G.W.R.; "*Clan Mackenzie*," 14768, 4–6–0, "Clan, H.R.," L.M.S.; "*Loch Ericht*," 14381, 4–4–0, "Loch, H.R.," L.M.S.; "*Queen Alexandra*," 5104, 4–4–0, "Alexander, D9," L.N.E.R.; or "*Queen Alexandra*," 4032, 4–6–0, "Castle," G.W.R., or "*Queen Alexandra*," 87, 4–4–0, "Castle, U2," L.M.S. (N.C.C.); "*Baron of Bradwardine*," 6379, 4–4–0, "Director, D11," L.N.E.R.; "*The Green Knight*," 754, 4–6–0, "King Arthur, N15," S.R.; "*Sir Robert Horne*," 4066, 4–6–0, "Star," G.W.R.; "*Green Arrow*," 4771, 2–6–2, "Green Arrow, V2," L.N.E.R.; "*Southesk*," 6854, 4–4–0, "D40," L.N.E.R., or "*Countess*," 823, 0–6–0T, G.W.R.; "*Prince Rupert*," 5671, 4–6–0, "Jubilee," L.M.S.; "*Coldstream Guardsman*," 6114, 4–6–0, "Royal Scot," L.M.S.; "*King John*," 6026, 4–6–0, "King," G.W.R.; "*Lord President*," 2003, 2–8–2, "Cock o' the North, P2," L.N.E.R.; "*Sutton Nelthorpe*," 5439, 4–6–0, "Glenalmond, B8," L.N.E.R.

Branch News

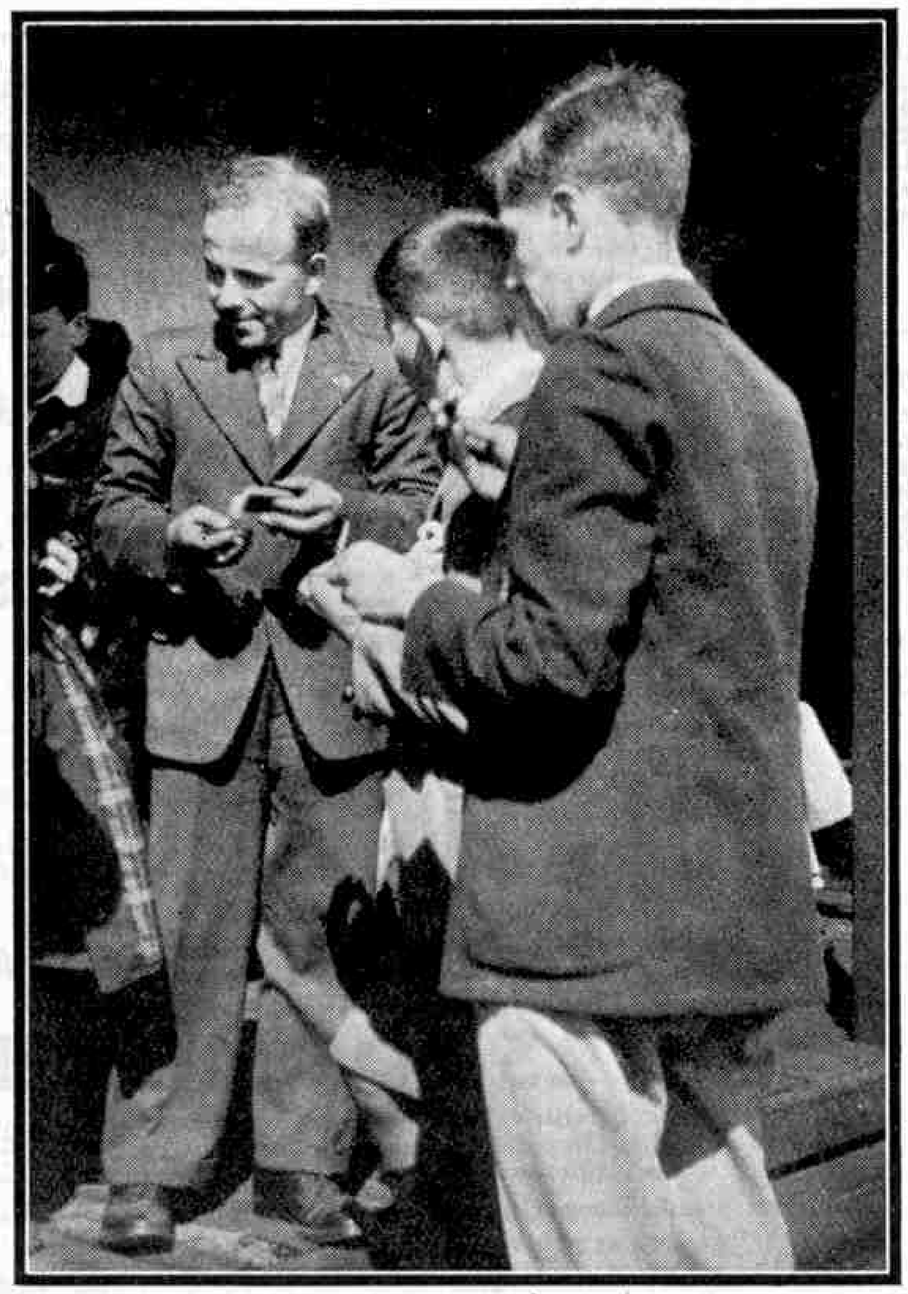
DOVER.—Good attendances have enabled intensive track operations to be carried out. The layout on one occasion was divided into sections, and looked very realistic with three and four trains running at the same time. S.R. passenger services have been reproduced in miniature, and were made specially interesting by the introduction of a through G.W.R. coach to Birkenhead. This coach has been painted in correct colours by members. Photographs of railway interest taken by members this summer were exhibited and discussed at one meeting. The commencement of the Winter Session was heralded by a complete overhaul of the Branch equipment. Secretary: D. F. E. Moore, 3, St. John's Road, Dover.

WATERLOO (DUBLIN).—Following the commencement of the hop-picking season, goods traffic on the Branch layout increased considerably, and services and trains often had to be trebled. The Branch locomotives are running very well, and their efficient operation amply rewards members for their care in overhaul and repair work. Secretary: S. B. Carse, 38, Oakley Road, Ranelagh, Dublin.

HORNSEA.—Interesting track operations have been carried out by the Junior and Senior Sections of this Branch. Layouts of various designs have been laid down, and the running of specialised traffic, such as milk and sheep trains, has proved of great interest. Secretary: P. Richardson, "Summerleigh," Esplanade North, Hornsea.

FIRST SHEFFIELD.—Excursions to places of railway interest have continued. On a recent trip to Manchester, members realised the meaning of the expression "packed like sardines in a tin;" for in their compartment were 19 passengers, one dog and two ferrets! The outing was voted very enjoyable, however. Retford was the scene of another outing, and the "Coronation" express was again seen there. The Winter Session began with a meeting at which interesting track operations were carried out. Secretary: W. H. Hutchinson, 35, Linden Avenue, Sheffield 8.

WANDSWORTH No. 1.—After many weeks of preparatory work, the film *"Fruitful Exchange"* was made recently by the Branch. The filming took several hours. Members carried out their parts splendidly and trains were run on the Branch layout with splendid accuracy. The film has developed extremely well, and the satisfaction of seeing it on a screen amply rewarded members for their work. Plans for future meetings are being discussed, and a recruiting campaign is to be instituted. The Branch layout is being prepared for winter working. A new station and engine shed have been added, and the main line track has been doubled. Two new corridor coaches and a new locomotive also have been acquired. A visit has been paid to the Model Engineer Exhibition at the Horticultural Hall. Secretary: A. H. St. Walker, 68a, Oakmead Road, Balham, S.W.17.



Mr. R. Croall, Chairman of the St. Giles' Cathedral (Edinburgh) H.R.C. Branch No. 272, snapped in a happy moment during a visit to the Rosyth Naval Dockyard. This Branch was incorporated in August 1934, and now has a membership of over 100.

ISLINGTON.—Good progress is being made in the construction of scale model track, and the main terminus station is nearing completion. This will be 6 ft. long and have four platforms. A scissors crossover point has been completed, and attention is now being paid to the automatic signalling system. Preparations continue for the Exhibition to be held on the 27th of this month in St. Giles' Hall. Details of this are given on page 676. Secretary: A. D. Straker, 48, Onslow Gardens, Muswell Hill, London, N.10.

NORTHAMPTON.—Several members recently spent an extremely enjoyable afternoon at Birmingham. The Tyseley Engine Sheds were first visited. There the hand-operated coaling plant was inspected, and several locomotives of various types were subjected to detailed examination. The offer of a short trip on the footplate of *"Bingley Hall"* was an agreeable surprise, of which members took full advantage. Members also saw a streamlined Diesel railcar undergoing tests. Tea in the city completed an interesting afternoon. The Branch summer camp was a great success. It was well attended, and members had great fun. Secretary: P. C. Collier, 33, Sandringham Road, Northampton.

EXETER.—The Winter Session has been commenced with renewed enthusiasm. Track operations are now carried out very efficiently owing to the special system employed. Concise rules and instructions have been drawn up in connection with each official position, and these are strictly enforced. Members are divided into three grades, according to their ability. To rise from one class to that above they must carry out certain duties of an exacting nature without fault. Secretary: J. Fenwick, 28, St. John's Road, Exeter.

FOLKESTONE.—A new G.W.R. 0-4-0 tank locomotive has been purchased, and now operates all passenger trains on the Branch layout. The hauling of goods trains and shunting work is carried out by a G.W.R. model locomotive. All rolling stock has been repainted, and trains now look very realistic. A visit has been paid to Folkestone Harbour, where boat trains and Channel steamers were viewed with great interest. Dover Engine Sheds also have been visited, and here some 14 locomotives were closely inspected. Secretary: F. E. Saunders, 79, Dover Street, Folkestone, Kent.

ST. STEPHENS (SALTASH).—The first track meetings of the new Session have been outstanding for the keenness of members, and train operations have been carried out with much greater efficiency and accuracy than previously. Games have been enjoyed at each meeting. Secretary: B. Braund, 9, Homer Park, Saltash.

Branches in Course of Formation

The following new Branches of the Hornby Railway Company are at present in process of formation, and any boys who are interested and desirous of linking up with this unique organisation should communicate with the promoters, whose names and addresses are given below.

LEATHERHEAD—L. G. Lambden, "Coveham," Fir Tree Road.

BARRY—J. R. Berg, 39, Broad Street.

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20	Australia	6d.	3	Gibraltar	2d.
1	,, ,, Jubilee	1d.	3	,, Cor. ...	1/-
5	Brit. Guiana ...	3d.	4	Guadeloupe ...	2d.
3	,, ,, Cor.	1/-	20	Greece	4d.
5	Barbados	2d.	15	Guatemala ...	6d.
3	,, Cor. ...	1/-	4	Gaboon	2d.
20	Canada	6d.	5	Hayti...	3d.
3	,, Jubilee ...	4d.	5	Honduras	2d.
1	,, Cor. ...	2d.	5	Hong Kong ...	2d.
20	Egypt...	6d.	10	,, ,, ...	5d.
15	Ecuador	6d.	3	,, ,, Cor.	1/-
5	Esthonia	2d.	4	Kedah	2d.
4	Cameroons ...	2d.	5	Kenya	3d.
5	Fiji Is.	3d.	5	Kenya, Ugan. & Tan.	3d.
3	,, ,, Cor. ...	1/-	5	Latvia	2d.
20	French Cols. ...	3d.	4	Lebanon	2d.
25	,, ,, ...	4d.	4	Labuan	6d.
30	,, ,, ...	5d.	10	Malay	5d.

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This wonderful offer comprises sets of stamps that will enhance the value of your collection. Czecho-Slovakia (President Masaryk), Holland (Jamboree), set old Canadians and Australians including King George, China (Sun Yat Sen), Philippine Isles and 2 Map stamps. A fine unused Morocco Coronation issue and set of old Belgium and Japan. All absolutely FREE. Just send 2d. postage, requesting approvals and free Catalogue. Collections purchased for prompt cash.

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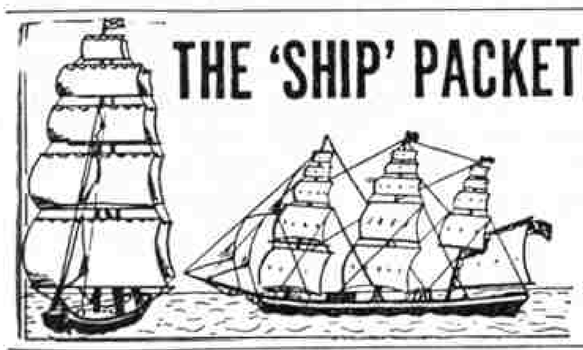
O. NERUSH (Dept. A), 68, TURNPIKE LANE, HORNSEY, LONDON, N.8.

THE 'SHIP' PACKET



This marvellous packet is offered under cost as an advertisement, **45 different stamps each with a ship on it.** A regular armada. **KOUANG-TCHEOU,** new, **SENEGAL** (Canoe), wonderful flotilla of caravels from **DENMARK** (complete set), **NEW CALEDONIA, UKRAINE, COSTA RICA,** a fleet of **7 CHINESE** junks usually sold at 10d., **TRINIDAD & TOBAGO, MAURITIUS, KENYA-TANGANYIKA, NEWFOUNDLAND, U.S.A., B. GUIANA,** set of **S. AFRICA, GREECE, POLAND, INDO CHINA, FRENCH OCEANIA, WALLIS & FUTUNA ISLANDS,** etc. Price **4½d.,** postage 1½d. (abroad 3d. extra). Purchasers of this packet asking for approvals receive **FREE** set of **3 SPAIN** (Columbus, each with his ship on it). Senders of addresses of stamp collectors receive **FREE** set of **6 VENEZUELA or 6 PERSIA. 100 BRITISH COLONIALS 1/-. 20 AIRPOST 6d., 6 TRIANGULARS 7d., 50 PERSIA 4/-, 9 POLAND** New Pictorials 8d., **VOLUMES OF B.O.P. CHEAP.**

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A trial will convince you. Just send 2d. for postage, etc., and I will reply *by return.*

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100 DIFFERENT STAMPS FREE to applicants for ½d. approvals. Cox, 14, Broadmead Av., Worcester Park.

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MINT SETS. Cooks, Niue or New Zealand **1/2 ea.**

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100 PERSIA Different (incl. Air and Coronation) **2/9**

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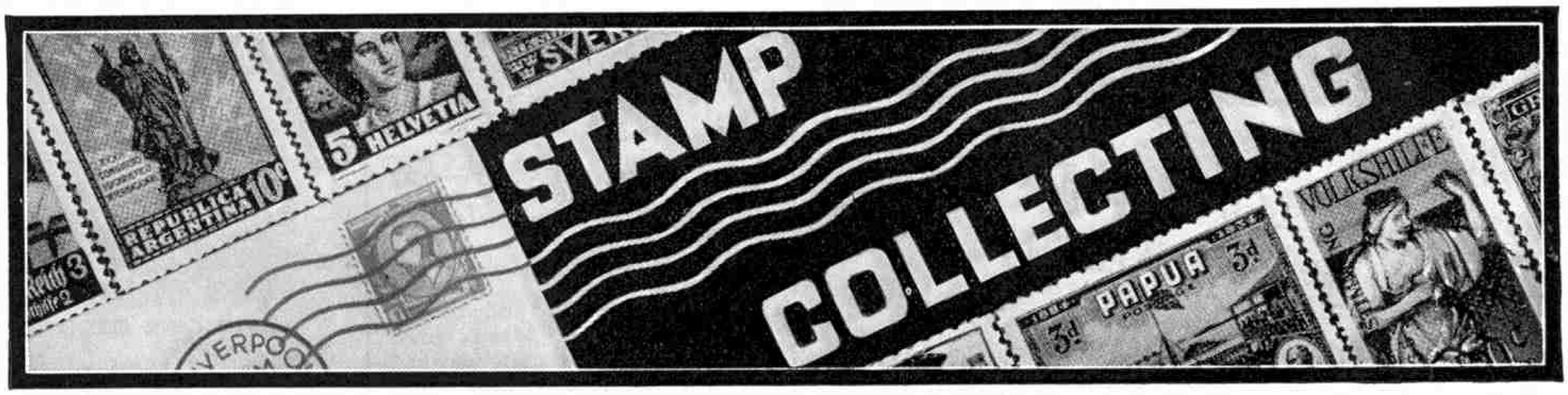

NATIVE LIFE ON STAMPS

ONE of the many fascinations of stamp collecting is that the collector can sit at home in a comfortable arm chair, and roam the world in fancy as his stamps bring to him vivid glimpses of the world's affairs. We are all interested in the people of other countries, their surroundings, their costumes, their habits and their customs, and our interest is perhaps keenest in races still living in primitive conditions. The stamp album is full of pictures of such peoples, and those who wish to make a collection of designs featuring native life and customs have enough material available to keep them occupied for quite a long time.

A native potter.

Africa alone presents such a large field that in the present article we shall deal only with stamps from that continent. A random glance at African stamps in the album reveals portraits of members of many tribes. Belgian Congo issues are particularly rich in this respect, showing both men and women of natives of various regions. Mandingo men are to be found on Liberia's 75c. stamp of 1918. There is a native of Somaliland on Eritrea's 10c. issue of 1930, and a Ruanda dancer and a pair of Urundi women figure on the 5 fr. and 1 fr. stamps of Ruanda—Urundi's issue of 1931. A Moorish horseman is shown on the Spanish Moroccan Express issue of 1928, and a Hausa native on the upper Volta 2c. issue of 1928.

The elaborate hairdressing of some of the women shown on these stamps is of special interest. For instance, the Ubangi woman's coiffure is a remarkable piece of work, achieved by first soaking the hair in palm oil and then treating it with a surface coating of camwood dust. It is built up to last for several months without re-dressing.

Many African tribes still live in huts of mud and straw, some even in rudely constructed shelters in trees. Typical native huts built of woven mats of straw are shown on several stamps of Tchad's 1930 issue. Liberia's 25c. of 1909 shows a type of straw-thatched hut that is similar to the huts commonly found in villages in the Mozambique country, seen on the ½c. stamp of the Mozambique Company's 1918 issue.

Better known types of dwellings are the baked-mud Kaffir huts shown on S.W. Africa's 5/– issue of 1931, and the native kraals pictured on the 15c. and 25c. stamps of the Belgian Congo 1931 series. The kraal of a Ruanda chief, shown on the Ruanda-Urundi 25c. stamp in the 1931 series, is a particularly interesting example and it is not surprising to learn that these huts are probably the best kept in Africa. Ruanda housewives are house proud to an exceptional degree. The men are probably the finest specimens of mankind on the African continent, most of them standing over six feet in height.

Kaffir huts.

A native chief from the Belgian Congo.

Types of natives from the Cameroons.

Simple farming, hunting, fishing and cooking suggest themselves automatically as the chief occupations of natives, and there are many stamp designs to illustrate these activities. Other occupations, in which natives often display considerable skill, are wood carving, the making of pottery, basket making and weaving. The Belgian Congo series of 1923 provides a striking range of designs illustrating these pursuits, and it is interesting to note that the border frames of all the stamps in this series are based on typical native art.

Weaving on a hand loom.

The potters of the Belgian Congo tribes are mainly women. They dig out the clay from the river beds, shape the material and dry out the vessels in the sun. The final "firing" of the clay is done over log fires. The Mandingo men shown on Liberian stamps, to whom we have referred briefly already, are noted for their skill in leather work, in dyeing clothes and especially in metal work.

Although the majority of African tribes to-day live peacefully, most of them maintain fighting forces. A typical warrior with tattooed face and feathered headdress is shown on the low values of Gaboon's 1910 series. The lance-like spear this warrior carries is a particularly deadly weapon. It is not thrown, but is used in much the same way as modern infantry troops use the bayonet.

With many tribes, bows and arrows are the principal weapons of offence, and a typical archer is shown on the 50c. stamp of the Belgian Congo's 1923 issue. The manner in which the Congo archers use their bows is unusual. When a victim has been marked down, the bow string is pulled sharply, causing it to emit a loud "twang." The prey's first instinct is to stop and look for the source of attack, and in that moment of stillness the archer is able to fire off his arrow at a stationary target.

One of the features of native life that has always puzzled Europeans is the system of sending messages through the forests from village to village by the beating of drums. So rapidly is news passed on by this means that it has come to be known as the "bush telegraph." The Belgian Congo 60c. stamp of 1931 shows two drummers, one of whom is carrying a drum used in sending messages. The second drummer is carrying one of the famous tom-toms. The French Somali Coast issue of 1915 also shows a native drummer.

Native musicians and dancers have been a favourite source of inspiration for stamp designers, and Belgian Congo issues show several examples. The 40c. value shows two flute players, while on the 50c. stamp an unusual native instrument known as the ekimbe, is being played. The principal feature of this instrument is a length of board along which are loosely mounted metal strips. Wooden wedges are placed under the metal at different distances from the board so that different notes are emitted when the strips are struck. It is played in much the same way as the dulcimer or xylophone.

There is not space here to detail all the many other aspects of native life that are revealed through the stamp album, such as types of personal adornment, foods, transport, domestic utensils and equipment, recreations and so on, but each of these topics can be examined thoroughly. Any reader who cares to compile a collection of stamps depicting native life will find the subject intensely fascinating, both for himself and for those of his friends who are privileged to see the collection.

Congo village storehouses.

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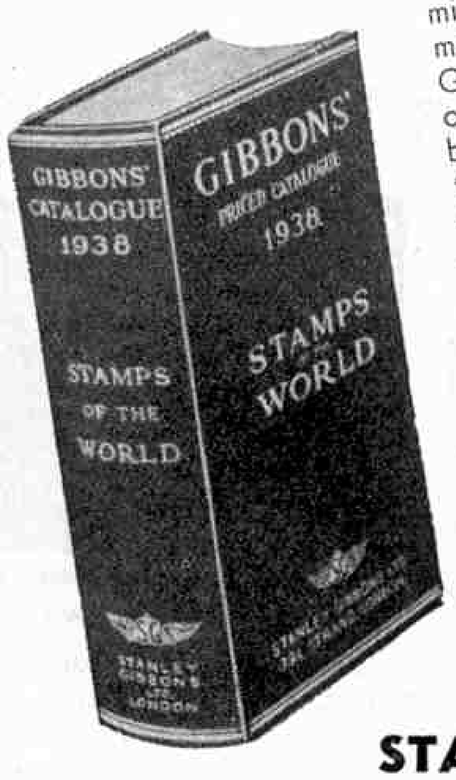

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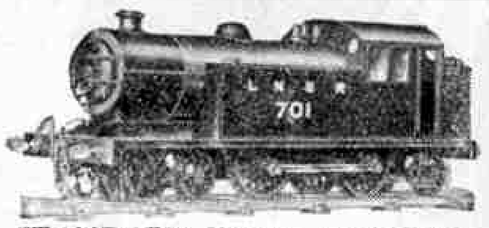

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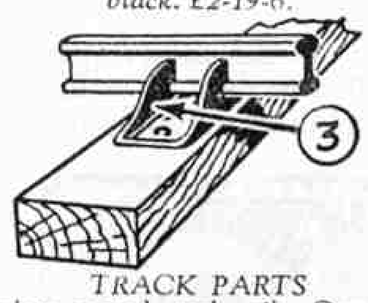

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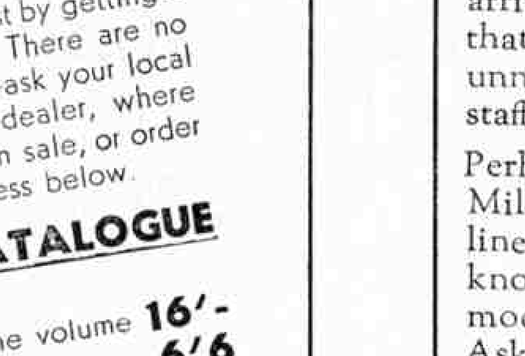

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THIS UNIQUE packet contains stamps bearing the heads of murdered persons—RUSSIA (Czar), murdered in a cellar. ITALY, Romulus and Remus, one killed the other. CAESAR (stabbed). JUGO-SLAVIA (mourning stamps) King Alexander, who was shot. 4 CHINA, Martyr's issue, Teng Keng and his compatriots (all were assassinated). GREECE, Rigas Feros (killed by the Turks). U.S.A., President Lincoln (shot in a Theatre). Send 1½d. postage, ask for approval sheets and receive the packet free. Senders of collectors' addresses receive 6 Venezuela or 6 Persia free. 100 B. Col. 1/-; 20 Airpost 6d.; 6 Triangular 7d.; 20 Brazil 8d.

H. C. WATKINS (M. Dept.), GRANVILLE ROAD, BARNET.

For other Stamp Advertisements see pages 684 and xxx

Stamp Gossip

and Notes on New Issues

King George VI Colonial Issues

Preparations for permanent King George VI issues are well advanced in most of the British colonies, and already a number of them have announced preliminary details. In most cases the designs will be pictorial, with a simple inset portrait of the King.

British Honduras is to issue a series of 12 stamps as follows: 1c., Maya figure; 2c., chicle tapping; 3c., Cohune palm; 4c., local products; 5c., grape-fruit; 10c., mahogany logs on river; 15c., Sergeant's Cay; 25c., dory (kind of boat); 50c., chicle industry; $1, Court House, Belize; $2, mahogany cutting; $5, coat of arms.

The British Somaliland issue also will be a pictorial series with designs as follows: ½, 1, 2 and 3a., vignette of a black-headed sheep, with a border design of spears and bucklers; 4, 6, 8 and 12a., vignette showing the head of a Greater Kudu antelope; rupee values, an outline map of Somaliland. In all values the name of the territory, "Somaliland Protectorate," will be displayed at the top and the value at the base.

Malta is to issue an entirely new pictorial series and the designs in this case will offer a most interesting series of views as follows: ¼d., Grand Harbour; ½d., Fort St. Angelo; 1d., Verdala Palace; 1½d., neolithic hypogeum (monument); 2d., Citadel of Victoria, Gozo; 2½d., the Grand Master de L'Isle Adam entering Mdina; 3d., St. John's Co-Cathedral; 4½d., Mnajdra temple; 6d., Grand Master Manoel De Vilhena; 1s., Maltese girl wearing the "Ghonnella" or "Faldetta" traditional headdress; 1/6, St. Publius; 2/–, Mdina (Notabile); 2/6, Grand Harbour; 5/–, Palace Square; 10/–, St. Paul.

Nigeria also is to issue a full set of pictorials, in which the eight lower values will feature types of mail transport as follows: 2a., Dak runner; 2½a., bullock cart; 3a., two-horse cart; 3½a., camel post; 4a., mail train; 6a., P. & O. steamer; 8a., mail lorry; 12a., Armstrong-Whitworth "Ensign" type aeroplane. The new 2/6 value will use the existing design showing the Victoria-Buea road, and the 5/– value will have the design at present in use for the 10/– value, the River Niger at Jebba.

The first three values of the new Barbados series, ½d., 1d. and 1½d., have already been despatched to the Colony, and will be on sale shortly.

Bermuda is retaining most of the existing designs, but certain of the colourings are to be modified. A new series will probably be issued for the higher values, 2½d. and 2/– to £1.

Ceylon also will retain most of the existing designs. Apart from the substitution of the portrait of King George VI and slight alterations to the borders, the only changes will be in the 10c. value, which is to show the Sigiriya or "Lion Rock"; the 20c., which will take the 9c. design, showing tea plucking; and the 2r. value, in which an ancient guard stone will be seen.

Seychelles is to have an entirely new issue, with three pictorial designs used over 15 values. These designs will show a coco-de-mer palm tree, a giant tortoise, and a fishing pirogue respectively. Each design will embody the King's portrait.

Trinidad and Tobago will use the existing designs with the new King's portrait.

Mother and Child Designs

On occasions the minds of stamp designers run on the same lines. A striking instance of this is afforded in the new issue supplement included in the October number of *Gibbons Stamp Monthly*, in which there are seven designs incorporating pictures of mothers with babies. The fact that five of the issues were devoted to children's or nursing charities explains to some extent the similarity in design.

We illustrate the 2K value from Czechoslovakia's Child Welfare issue showing a lullaby scene at a baby's cradle. The two lower values in this series, 50h. and 1K, show the mother, child and cradle only. The other four charity designs were Austria's 24g. Mother's Day commemorative, Belgium's Queen Astrid Public Utility Fund series of eight stamps, each showing a portrait of the late Queen Astrid and the baby Prince Baudouin, Colombia's 5c. Red Cross tax issue, and France's 65c. Health Society stamp.

We also reproduce the United States Virginia Dare commemorative, to which we referred in the September "*M.M.*" Virginia Dare was born in Kentucky in 1587, and was the first white child born in the U.S.A.

India's New Stamps

This month we are able to reproduce the first of India's King George VI stamps, which are among the most important issues of the new reign.

It will be seen that the general features of the new design differ materially from those of previous issues, the characteristic pointed arch of Indian architecture having been adopted for the framing. The ornaments in the upper corners are lotus buds.

Latvian Independence Monuments

Readers who are interested in statuary as depicted on stamps will find considerable interest in a recently issued Latvian series, on which are shown monuments erected in different parts of the country to commemorate the achievement of independence. We illustrate two of them, the 3s. and 35s.

values, showing the Independence Monument at Rauna and that at Riga respectively.

The series contains seven stamps in all, the other designs being as follows: 5s., Cemetery Gate, Riga; 10s., Independence Monument at Jelgava; 20s., War Memorial at Valka; 30s., Independence Monument at Iecava; and 40s., Monument at Visagalas Cemetery.

A United States Centenary

The recent United States commemorative celebrating the 150th anniversary of the enactment of the North West Territory Ordinance is reproduced here.

The design shows the two leaders, Cutler and Putnam, who were responsible for negotiating this ordinance, which brought the vast area then known as the North West Territory into the United States. The respective areas of the two territories at that time are also shown in the design, which makes a most interesting addition to the list of map stamps.

Airways are Mailways

Following the note in our August issue concerning the carriage of Empire mails by air without surcharge, several readers have asked us to give them a list of countries to which mail is now sent by air at ordinary postage rates.

Certain extensions of the scheme, other than the Empire interest, were made in August and the list is now a very comprehensive one for it covers 21 countries. These are Austria, Bulgaria, Czechoslovakia, Danzig Free State, Denmark, Estonia, Finland, Germany, Greece, Holland, Hungary, Yugoslavia, Latvia, Lithuania, Norway, Poland, Roumania, South Russia, Sweden, Switzerland, and Turkey.

We thank Stanley Gibbons Ltd. for their courtesy in loaning the stamps from which the illustrations on this page have been made.

A Belfry on the Ground

By Robert Light

Most old churches have some particularly interesting feature, but few are more remarkable in this respect than the one at East Bergholt, Suffolk, which has its belfry on the ground. The bells at this church are inverted, and are mounted on thick pieces of oak. They are rung by swinging them over into a pit below, and back again by hand, and the belfry is claimed to be the only one in existence in which the bells are swung by handling their stocks.

This curiosity was erected over 400 years ago. The tower of the church was commenced by Cardinal Wolsey about 1520, but at his downfall it was left unfinished, as it remains today, and a cage was built in the churchyard to house the bells.

There are five bells. The treble bell is fairly modern. It was cast in 1887 and weighs 12¼ cwt. The second bell, known as Gabriel, is much older. It was founded in the year 1450, and weighs 12¾ cwt. The third and fourth bells weigh 14¾ and 18¾ cwt. respectively. The tenor bell is the largest, weighing 25 cwt.

A Dog At His Heel

By CHARLES J. FINGER

Illus. 8′6 *net*

A tale of a dog among sheep-farmers, first in Western Australia, then in South Africa, and finally in the Argentine. "The kind of book that will interest everybody to whom a rattling good tale of adventure appeals."

—*Tail Waggers Magazine.*

Corporal Corey

By JACK O'BRIEN

Illus. 5′- *net*

This grand story of life in the Royal Canadian Mounted Police is by the author of *Valiant*, which was a Junior Book Club Recommendation last year (now published at 3′6 in Harrap's Green Riband Library).

FROM ALL BOOKSELLERS

HARRAP

A Strange Pumping System

By G. R. Stocks

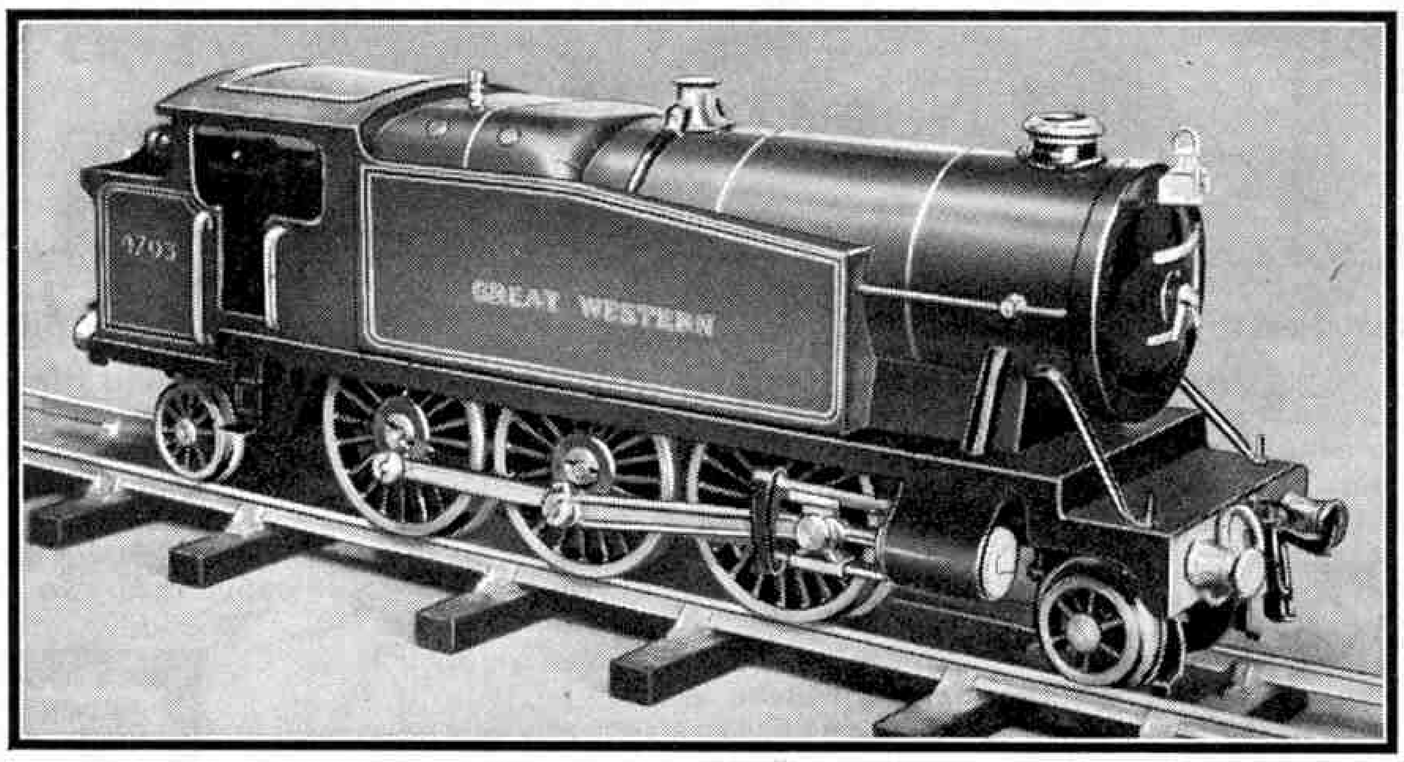
On a recent visit to Germany I spent a day in Bad Munster am Stein, one of the oldest health resorts in Germany. The most remarkable feature of the town is the system of "Gradierwerke." A "Gradierwerk" is a huge wooden frame, about 30 ft. high and 100 ft. long, which is built up in a large reservoir that also is made of wood. The framework is filled with closely-packed cuttings of blackthorn, with the twigs and leaves pointing outward, so that the structure resembles a gigantic hedge enclosed in a wooden fence, and on top of it is a wide trough.

There are four of these frames in different parts of the town. The oldest was erected in 1718 and the most recent in 1778, and their purpose is to concentrate the salts in the curative water from the springs. The lower reservoir contains the liquid, which is pumped to the upper trough. From there it trickles down over the blackthorn twigs in countless streams, and water is driven out of it by evaporation caused by the prevailing winds.

All parts of the machinery are made of wood, the pump-barrels consisting of hollowed-out tree trunks. The motive power for the system is obtained from the flow of the River Stein, along the bank of which are four 20-ft. water wheels of the undershot type, each developing about 5 h.p. The wheels are a considerable distance from the frames, and the rotary motion is converted by cranks into a horizontal movement and the power is transmitted to the pumps by long wooden connecting-rods. The system works well, only an occasional creak betraying the whereabouts of the rods, which for the greater part of their length run under the frames or in conduits.

The water of the springs flows out at the rate of nearly 400 cu. ft. an hour. It has a temperature of 31 deg. F., and a salinity of 11 per cent. Evaporation is regulated according to the wind, and the liquid is pumped from section to section of the frames in order to concentrate it as much as possible. While this is going on, patients visiting Bad Munster for cures recline facing the frames, breathing in the salt-laden air as they lie there.

The solution is finally pumped to an evaporating plant, where the salts in the spring water are crystallised out.



A clockwork model G.W.R. 2-6-2 or "Prairie" tank adapted from a Hornby No. 2 Special Tank Locomotive by Mr. E. M. Berry, the G.W.R. Stationmaster at Stroud, Gloucestershire. The original mechanism has been converted into a six-coupled one, outside cylinders have been fitted, and the footplate has been arranged to "drop" at both ends. The photograph is reproduced by courtesy of Mr. C. H. Barnes of Stroud.

Smashing the Atom

Scientists in various parts of the world are bombarding targets of various materials with protons and other tiny particles shot out from vacuum tubes at velocities that vary from 30 to 100 million m.p.h. The largest special unit for carrying out bombardments of this kind is being built by the Westinghouse Electric and Manufacturing Company in the United States.

The new unit consists of an immense tank shaped like a pear, which stands with its wider end uppermost. The tank is 47 ft. high and at its widest part has a diameter of 30 ft. Including the building on which it rests, the total height of the structure is 65 ft. Ladders enable the tank to be climbed and there is an outside platform from which its interior can be examined. Inside it there will be a generator producing a direct electrostatic current with a voltage of five million and more, together with a vacuum tube 40 ft. in length.

The giant vacuum tube will provide the shells used in this scientific bombardment, and these will be accelerated on their way down the tube by the high voltage applied to them. On reaching the end they will pass through windows consisting of thin sheets of metal, and will strike their targets with such tremendous force that they will penetrate the hard centres or nuclei of the atoms of which they consist, breaking them up and transforming them into other elements. The tank in which the vacuum tube will be housed will be filled with air at a pressure of 120 lb. per sq. in.

Hobbies 1938 Handbook

The 1938 edition of the catalogue issued each year by Hobbies Ltd. is as comprehensive and interesting as its predecessors, and more useful than ever to the handyman. In general arrangement it follows the lines of previous editions. As usual the main portion deals with fretwork, and gives descriptions and illustrations of fretwork apparatus and equipment of all kinds. There are many excellent illustrated designs for fretwork models, including folding tables of various kinds, clocks, bookcases and screens, and a complete collection of wood-working and carving tools is listed.

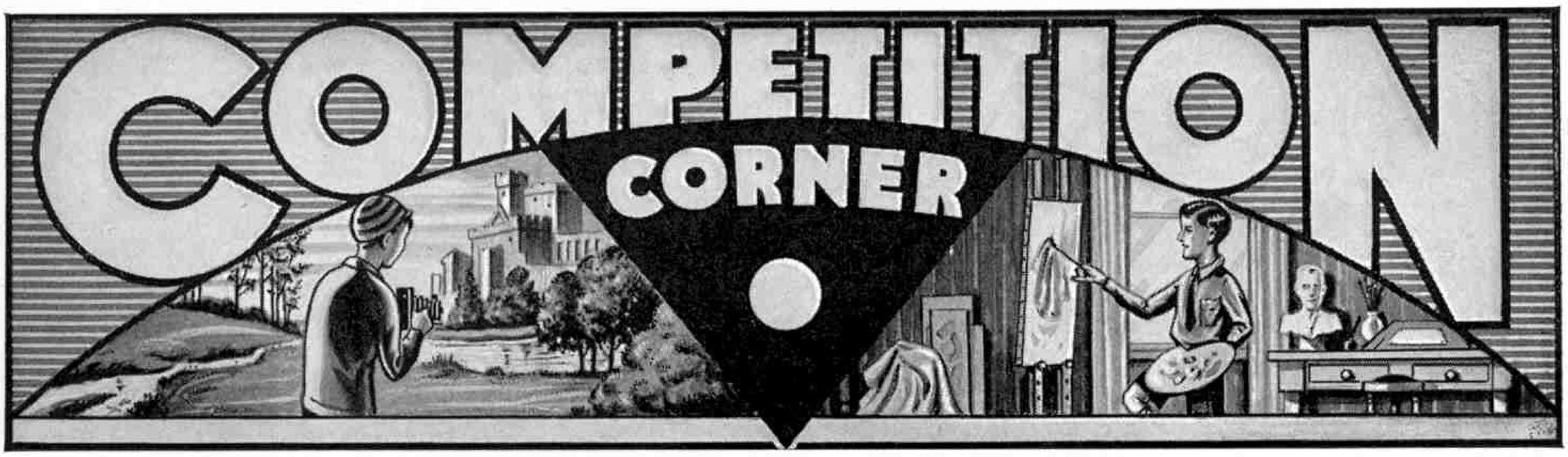
Special articles deal with a series of attractive models, including a handsome clock that forms the subject of one of the two large free design charts available for purchasers of the Handbook. Others explain the construction of ship models and calendars, for which a Colour Picture is given with the catalogue. The contents include also informative articles on various forms of craft work.

The catalogue can be obtained for 6d. from any newsagent or Hobbies dealer, or direct from Hobbies Ltd., Dereham, Norfolk, for 9d. post free.

Billiards in the Home

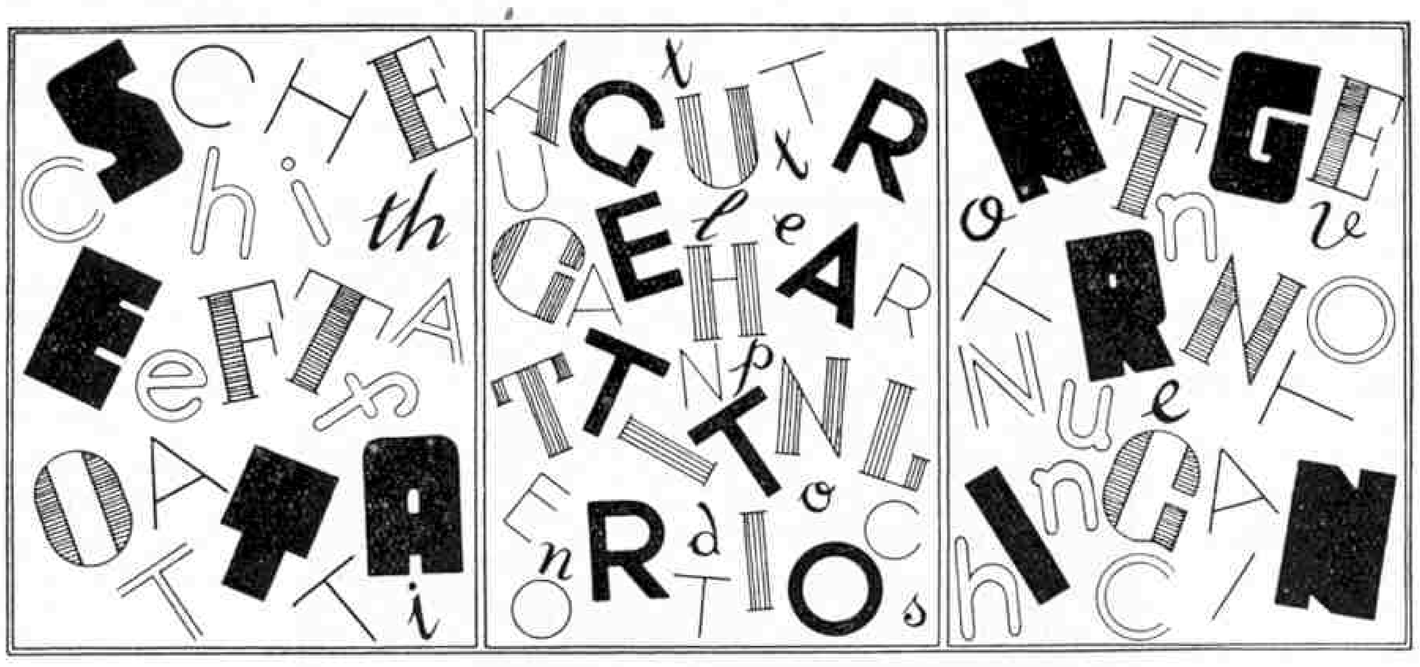
Billiards is one of the most fascinating of all games, and every year sees an increase in interest in tables on which the game can be played in the home. E. J. Riley Ltd. were pioneers of home billiards. Their products include models for every home, large or small, among them small tables that can be placed on an ordinary dining table, and others that are combined billiards and dining tables, the transformation from one to the other being made in two minutes. These tables are not toys. Whatever its size, every model is a replica in construction of the full-size tables for which the makers are world-famous.

"*M.M.*" readers who are interested in home billiards should write for a free illustrated art list of these tables. This will be sent immediately on application to E. J. Riley Ltd., Deal Works, Accrington, or Dept. 3, 147, Aldersgate Street, London, E.C.1.



HIDDEN PROVERBS

Some years ago we tried our readers' patience, and their keenness, with a series of "Hidden Proverbs" competitions. They proved so popular that we are sure another competition of the same nature this month will prove an interesting diversion, and, for some lucky readers, an opportunity to increase their stock of Meccano or Hornby Trains.



In the illustration in the centre of this page each of the three squares contains certain groups of letters which, when sorted out, will form the words of a well-known proverb. It will be noticed that each group contains six different styles of lettering, and the only clue to the solution of the puzzle lies in their introduction and the manner in which they have been used. One word of warning should be given. The means of solving one of the three puzzles will not necessarily prove the key to the others.

Prizes of Meccano Products, that is of any articles listed in the current Meccano and Hornby Train catalogue as the winners desire, to the value of 21/–, 15/–, 10/6 and 5/– respectively, will be awarded to the senders of the four most accurate solutions in order of merit. In addition there will be a number of consolation prizes for the next best entries. In the event of a tie, the prizes will be awarded to the entries displaying the neatest or most novel presentation, but it should be remembered that accuracy of solution will count first in the judging.

Entries should be addressed "Hidden Proverbs, Meccano Magazine, Binns Road, Liverpool 13," and should reach this office not later than 30th November.

There will be an Overseas section to this competition, open to readers living outside Great Britain and Ireland and the Channel Islands, and prizes of Meccano products of the same values as in the Home section will be awarded. Overseas entries must arrive not later than 28th February, 1938.

November Drawing Contest

As announced in our last issue, we are holding this winter a series of drawing competitions that are open to readers of all ages. No special subjects are set, the monthly prizes being offered simply for the best drawings or paintings submitted during the month. The entries may be of any size to suit the competitor's preference.

The entries each month will be divided into the usual two sections, A for readers aged 16 and over, B for those under 16; and prizes of Meccano products to the value of 21/– and 10/6 will be awarded in each section. Entries in the November competition must be addressed "November Drawing Contest, Meccano Magazine, Binns Road, Liverpool 13," and must arrive not later than 30th November. There will be special sections for Overseas readers in which prizes of the same value as in the Home sections will be awarded. Overseas closing date 28th February, 1938.

Intending competitors are reminded that unsuccessful entries can be returned only if a stamped addressed cover is sent.

Competition Closing Dates

HOME

"Hidden Proverbs" Contest	30th November
November Drawing Contest	30th November

OVERSEAS

August Photo Contest ...	30th November
August Crossword Puzzle	30th November
September Photo Contest	31st December
"Point Words" Contest ...	31st December
Hidden Advertisements Contest	31st January, 1938
October Drawing Contest	31st January, 1938
"Hidden Proverbs" Contest	28th February, 1938
November Drawing Contest	28th February, 1938

Watch the Closing Dates:

Competitors, both Home and Overseas, are particularly requested to make a careful note of the closing dates of the competitions.

In sending entries to competitions that are divided into age groups, competitors should take particular care to mark their ages clearly on the back of the entry. It is not sufficient merely to indicate the age group, as age allowances are given to ensure equality of opportunity for the younger competitors.

Entries, other than prize-winning efforts, for photographic, drawing and similar competitions, will be returned to the competitors concerned if a stamped addressed wrapper is sent with the entry, and its return requested.

COMPETITION RESULTS

HOME

"Point Words" Contest.—1. B. A. MITCHELL (Liverpool 4). 2. L. W. CHITTY (West Wimbledon, S.W.20). 3. F. MILLS (Kearsley). 5. J. C. BARTON (Colchester). Consolation Prizes: R. BARNETT (Birmingham); J. L. CARMEL (Warrington); R. L. CHITTY (West Wimbledon, S.W.20); J. O. GIBSON (Birmingham, 15); R. HARDYMAN (Wotton-Under-Edge); E. A. LIDGARD (Lincoln); J. C. SMITH (Bolton).

September Photo Contest.—First Prizes: Section A, A. ROE (Sheffield, 1); Section B, F. L. ATKINS (St. Leonards-on-Sea). Second Prizes: Section A, C. M. SINCLAIR (Glasgow, S.W.2); Section B, R. J. F. PHILLIPS (London, N.21). Consolation Prizes: J. W. BILLINGE (Brighton, 6); A. B. BISHOP (Bristol, 4); J. C. CAIN (London, S.W.1); P. F. CHAPMAN (St. Leonards-on-Sea); F. THOMSON (London, S.E.1).

OVERSEAS

June Crossword Puzzle.—1. E. A. BUNT (Capetown, S. Africa). 2. W. S. EAGLE (Bombay). 3. R. B. LATIMER (Rangoon, Burma). 4. R. MYBURGH (Claremont, S. Africa). Consolation Prize: D. I. MITCHELL (Grenada, B.W.I.).

June Photo Contest.—First Prizes: Section A, J. M. DEMANUELE (Valletta, Malta); Section B, R. MURRAY (Johannesburg, S. Africa). Second Prizes: Section A, N. SODERBERG (Falun, Sweden); Section B, R. MYBURGH (Claremont, S. Africa). Consolation Prize: E. BOURGAULT (Manchoukuo).

COME-COME!

A Chinese named Can-Cum was unable to go to work, so he asked his son to write a note to take to his place of employment.

His son wrote: "Can-Cum, can't come, will come, when can come."

* * * *

Binks: "What is it that is so brittle that you have only to name it to break it?"

Jinks: "Silence."

* * * *

"I shall put you fellows in this room," said the host. "You'll have a comfortable night, for it has a feather-bed."

At two o'clock in the morning one of the guests awoke.

"Change places with me, Dick," he said, "it's my turn to be on the feather."

* * * *

Customer: "I'm seeking something appropriate for a gift, something timely and striking."

Clerk: "Clock counter third on your left."

* * * *

"Doctor, is there any danger of the operation proving fatal?"

"Really, my good man, considering that we are experimenting on you free of charge, your idle curiosity is hardly good form."

* * * *

Bob: "What's the big idea? Last week you told me your father was in the lumber business. To-day you say he manufactures shoes. What is it?"

Bill: "Both. He makes wooden shoes in Holland."

* * * *

Bill: "Is Sam working yet?"
Jack: "Yes."
Bill: "Has he been working long?"
Jack: "About three weeks."
Bill: "What's he doing."
Jack: "Six months."

* * * *

Policeman: "Why the speed? Are you late for an accident or in a hurry to see the judge."

* * * *

"The dentist wasn't painless, mummy," said the little girl.

"Why, dear, did he hurt you?" asked her mother.

"No. But he yelled when I bit his finger."

* * * *

Diner: "I want some chicken, and the younger it is the better."

Waiter: "How about an egg, sir?"

* * * *

NO CRUELTY TO ANIMALS

Labourer's Wife (to village chemist): "You'll be sure to write plain on the bottles which is for the 'orse and which for me 'usband. I don't want nothin' to happen to the 'orse."

* * * *

Manager (paying salary in very dirty notes): "I hope you are not afraid of microbes, Jones."

Jones: "Oh, no, sir. I'm sure no microbes could live on my salary."

* * * *

"I say," said the English tourist, "you have a great many hills in this country of yours, Pat."

"Shure, of course," returned Pat, "there was so much land that we had to put it in heaps."

* * * *

Professor: "Didn't I get my last haircut in this shop?"

Barber: "I think not, sir; we've only been in business just over two years."

* * * *

At a Christmas party the little son of the house had just played his piece and his mother was beaming.

"Don't you think my son has talent?" she said to one of her visitors. "If you have a special wish, just name it. Georgie can do just what he likes with the piano."

"Er—could he shut it?" asked the visitor.

* * * *

"Didn't you tell me you'd rubbed down hundreds of horses?" growled the proprietor of the stables.

"So I have, guv'nor," said the temporary groom, "only we used to rub 'em dahn wiv sandpaper—'fore they were painted."

WELL, I NEPHYR!

A cow named the Burlington Zephyr,
Was a speedy and reckless young hephyr;
When her owner drew near,
She kicked off his ear,
And now the poor farmer's much dephyr."

("*The Railway Gazette.*")

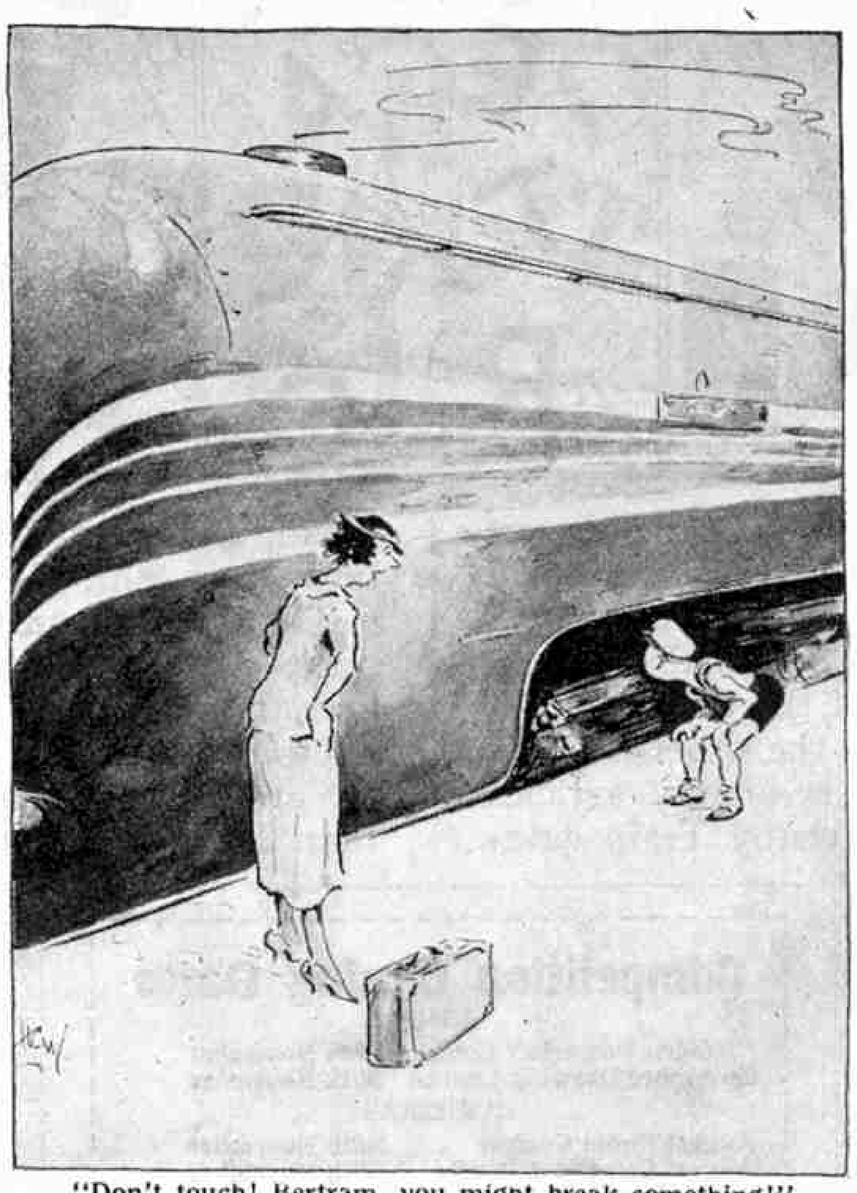
* * * *

Basham: "If I had all the medals I won at boxing when I was a younger man, I could start a jeweller's shop."

Misitt: "Ah, yes, and if I had all the ducks I got at cricket when I was a younger man I'd be owning the biggest poultry farm in the country."

* * * *

RECORDS



"Don't touch! Bertram, you might break something!"
(*Courtesy of the "L.M.S. Magazine."*)

Boy (to shopkeeper): "My mother says if you didn't make your holes in your muffins so large, they would be bigger."

Shopkeeper: "Ah, an' if your mother paid for all muffins she'd had, her bill would be a lot less."

* * * *

Wigg: "Sandwich men seem to get very poor wages."
Wagg: "Yes, but they do get their board thrown in."

* * * *

A fellow has to be a contortionist to get on these days. First he has to keep his back to the wall and his ear to the ground. Then he must put his shoulder to the wheel, his nose to the grindstone, keep a level head and have both feet on the ground!

* * * *

Master: "Well Smith, what is a tissue?"
Smith: "A sneeze, sir."

* * * *

THIS MONTH'S HOWLER

Sheep is mutton covered with wool.

NATURALLY

Customer (angrily): "Those apples you sold me yesterday had a fishy taste."

Grocer: "Quite right. They were crab apples."

* * * *

Diner: "Rastus, I ordered chicken soup. What's this you've brought me?"

Rastus: "Why, suh, dat's chicken soup."

Diner: "It may be chicken soup; but there's no chicken in it."

Rastus: "No, suh; but dey is no dog in dog biscuits either."

* * * *

Judge: "Do you challenge any of the jury?"

Defendant: "Well, I think I can lick that little guy on the end."

* * * *

He: "I hope my visits are not disagreeable to you!"

She (politely): "Not at all."

He: "I have sometimes thought that I worried you!"

She: "Oh, no! No matter how gloomy I feel when you call I am always happy when you go!"

* * * *

Sandy entered a shop where he had recently purchased a bicycle.

"It's about the bike," he said.

"Hasn't it arrived yet?" asked the shopman.

"It has, said Sandy. "But where's that free wheel you spoke about?"

* * * *

"Any empty soda or ginger-ale bottles to sell?" enquired the man at the back door.

"Do I look as though I drank that stuff?" asked the housewife, annoyed.

"Well, then," continued the man, "any vinegar bottles?"

* * * *

Jack: "Oh, I'm sorry, I forgot to ask you to my picnic party to-morrow."

Jim: "Too late now. I prayed for a blizzard."

* * * *

Magistrate: "Have you ever done anyone a good turn in your life?"

Prisoner: "Yes, your Worship, I've kept four detectives in regular employment for 10 years."

* * * *

Amateur Gardener: "I don't seem to be able to tell my garden plants from weeds. How do you distinguish them?"

Old Farmer: "The only sure way is to pull 'em out. If they come up again, they're weeds."

* * * *

GOOD FOR BUSINESS

"Yes," said the stranger, "this hiking is a fine idea. Nothing pleases me better than to see crowds of people on the roads these days."

"Do you hike yourself?"

"Oh, no, I'm a manufacturer of corn plasters!"

* * * *

Customer: "I warn you, I sha'n't be able to pay for this suit for three months."

Tailor: "Oh, that's all right, sir. Don't worry."

"Thanks. When will it be ready?"

"In three months, sir."

* * * *

Mr. Brown (who has fallen): "Don't cry Teddy, I'm not hurt."

Teddy: "No, but my banana is; you're sitting on it.'

* * * *

"Nature," said the philosopher, "always makes compensations. If one eye loses its sight the other becomes stronger. If one ear loses its hearing, the other becomes more acute."

"I believe you're right," said an Irishman. "I've always noticed that when a man has one short leg, the other is longer."

* * * *

"Martha, did you wash the fish before you baked it?"

"Lor', mum, no! Wot's the use of washin' a fish wot's lived all 'is life in water?"

* * * *

Father: "Why were you kept in at school?"

Mike: "I didn't know where the Azores were."

Father: "In future, just remember where you put things."

"MERSEY MODEL" STEAM ENGINES

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Model	51	12/6
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,,	52G	19/6
,,	52R	21/6
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,,	53	25/6
,,	53G	28/6
,,	53R	31/6
,,	53GR	34/6
,,	54	37/6
,,	54R	42/6
,,	54D	47/6
,,	55	45/6
,,	55R	49/6

Models for Driving

Circular Saw	5/–
Grindstone	2/6

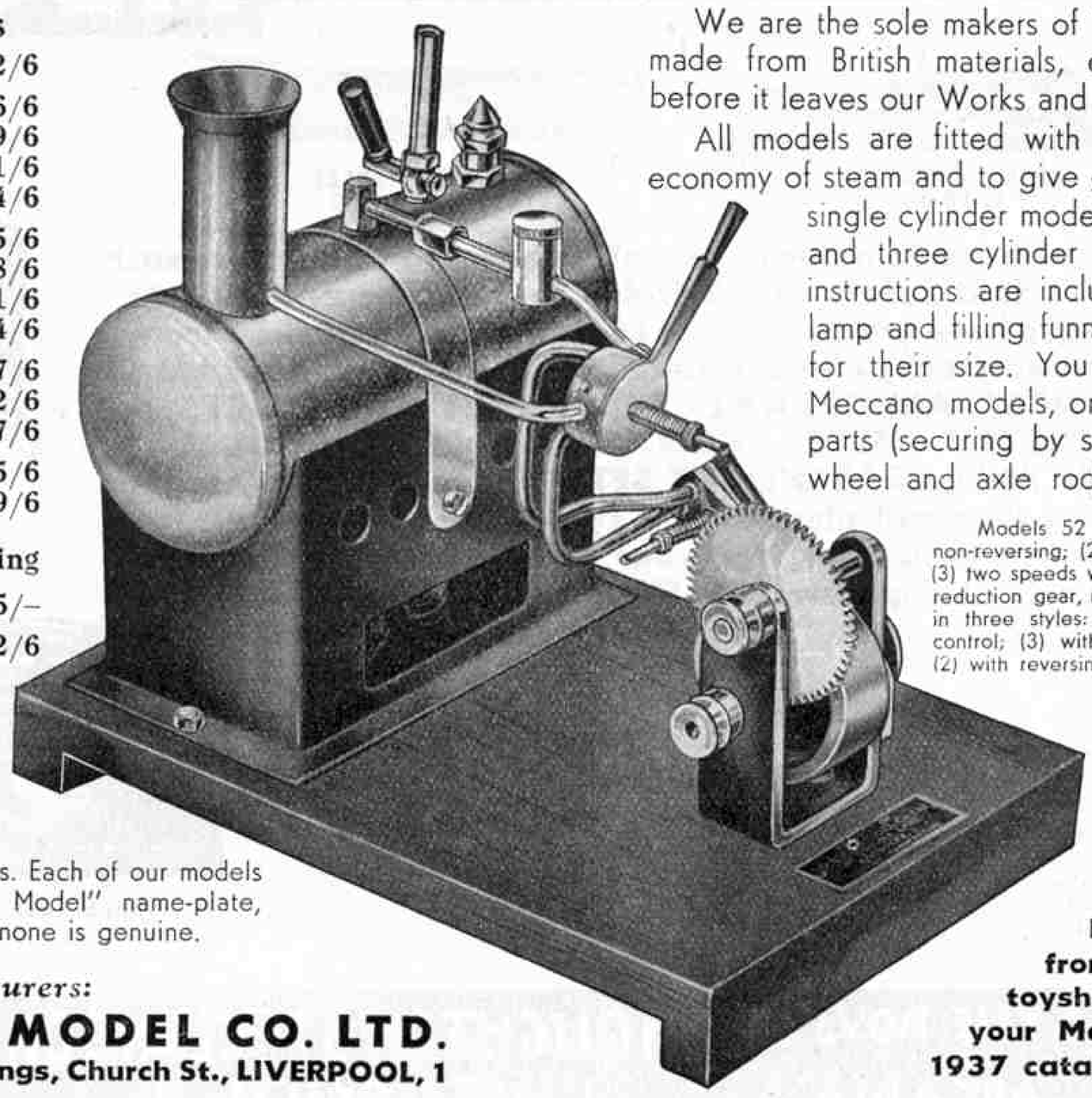

Illustration shows model 52GR. Retail price 24/6 complete.

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Models 52 and 53 are supplied in four styles: (1) single speed, non-reversing; (2) single speed, with reversing valve and speed control; (3) two speeds with reduction gear, non-reversing; (4) two speeds with reduction gear, reversing valve and speed control. Model 54 is supplied in three styles: (1) non-reversing; (2) with reversing valve and speed control; (3) with dynamo. Model 55 is supplied: (1) non-reversing or (2) with reversing valve and speed control.

We also list Speed Boat power plants, each complete with boiler stand, lamp, three-bladed propeller, driving shaft, stern tube, universal coupling and bracket fitting. No. 1, Single Cylinder, price 15/6. No. 2, Vertical Twin, price 29/6.

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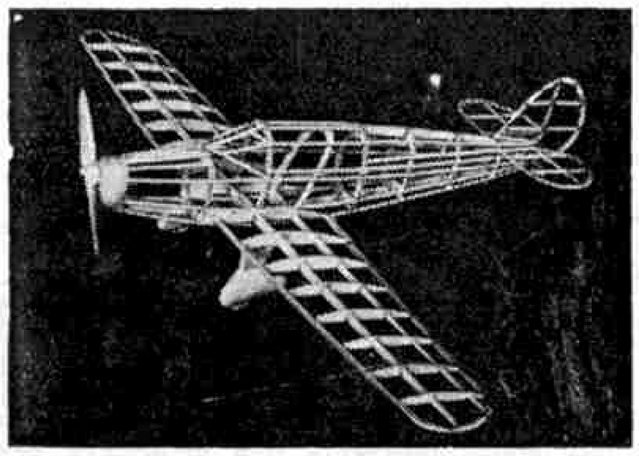

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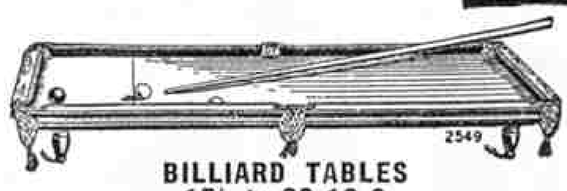

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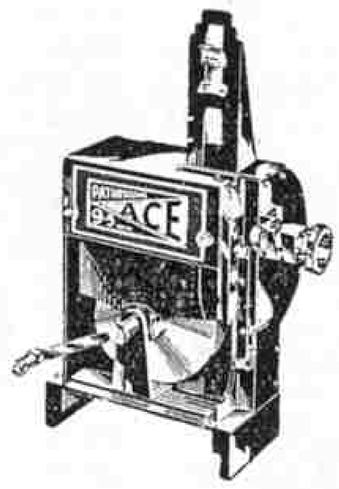
It must be a boon to parents, as well as boys, to find a store such as Lucas's that caters so admirably for Hobbies and Models. Illustrated here are only a few typical examples taken from their huge stock, which includes LOCOMOTIVES, STEAM ENGINES, AEROPLANE SETS, FRETWORK SETS, CHEMISTRY SETS, CONJURING SETS, MODEL THEATRES, SEARCHLIGHT SETS, and a host of other Gifts that will gladden the eye of the modern boy. Please remember, for your own comfort and to avoid disappointment—SHOP EARLY FOR XMAS THIS YEAR.



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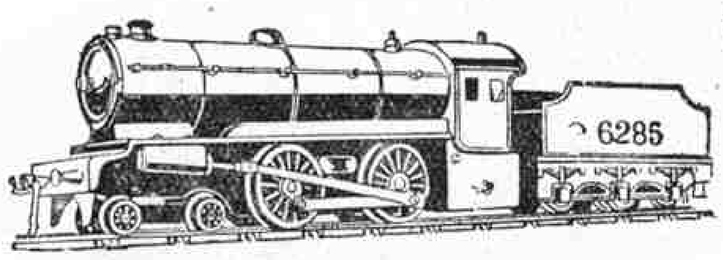

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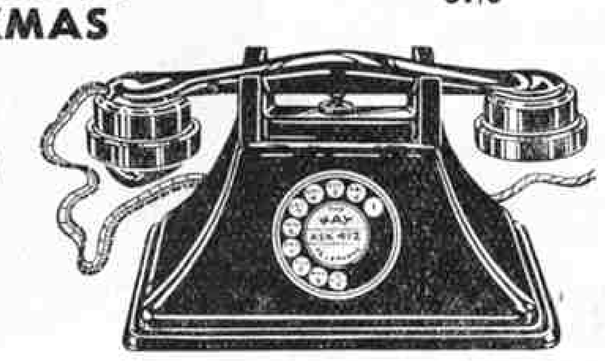

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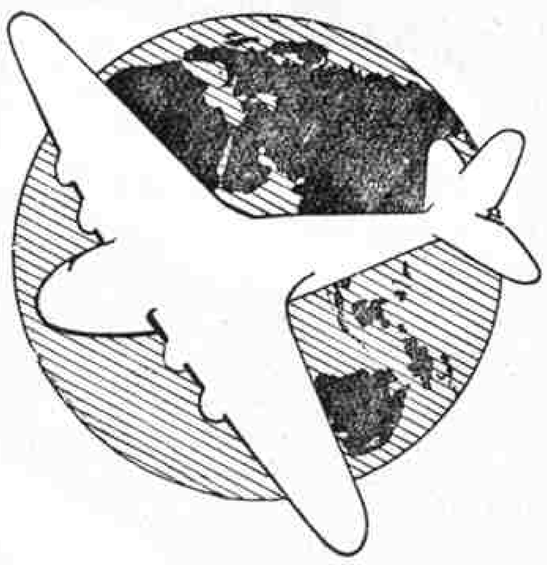

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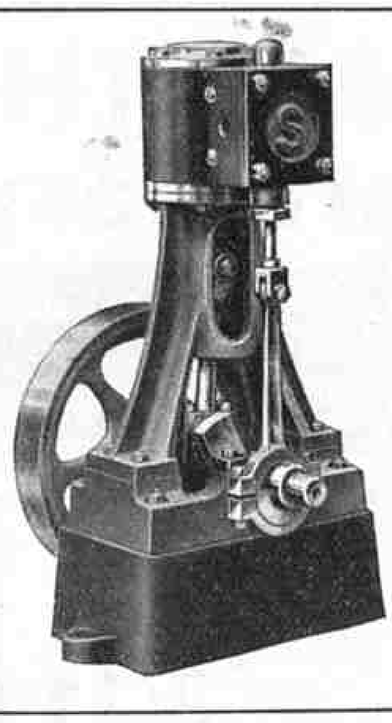

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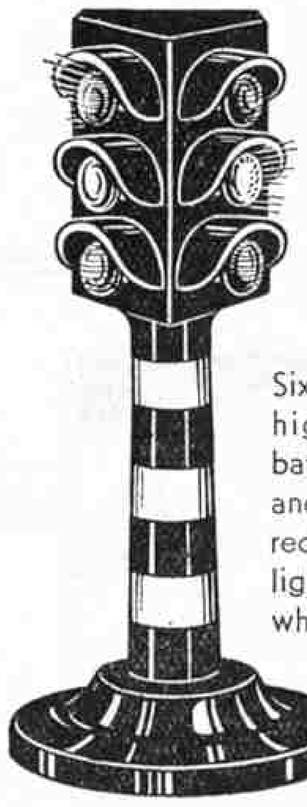
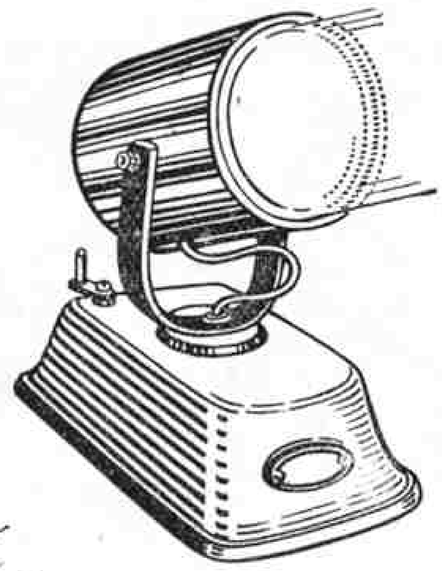


TRAFFIC LIGHT

Six-Light model, 6¾ ins. high. Complete with battery housed in stem and switch controlling red, amber and green lights. Black finish with white lines.

Price **3′6**



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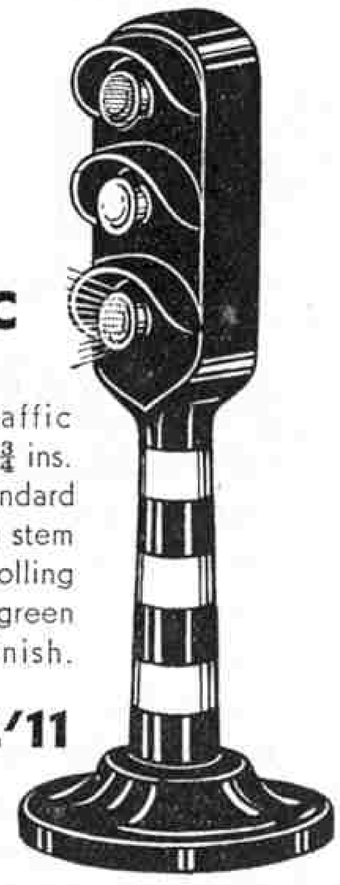

TRAFFIC LIGHT

Three-Light Traffic Signal. Height 7¾ ins. Complete with standard battery housed in stem and switch controlling red, amber and green light. Black finish. White lines.

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FLOOD-LIGHT

Realistic model, swivel action, complete with battery leads.

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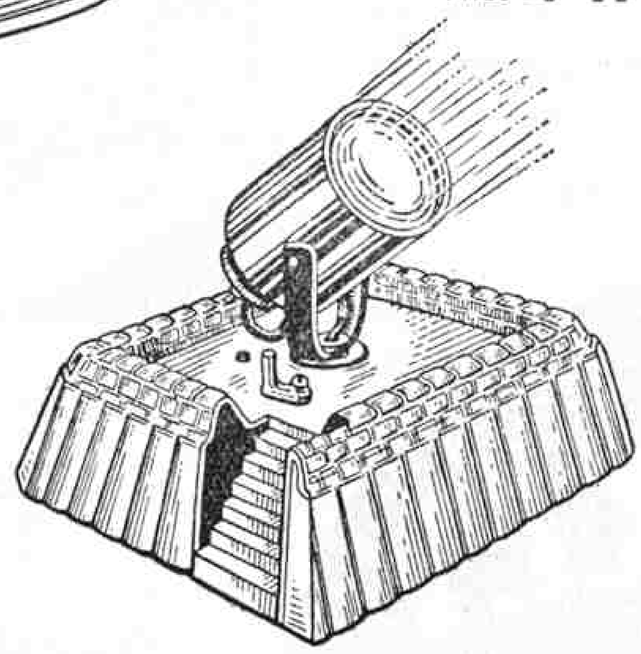

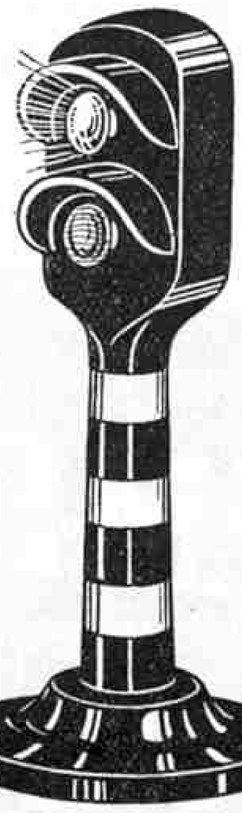

TRAFFIC LIGHT

Two-Light Railway or Traffic Signal. Height 6¾ ins. Complete with standard battery housed in stem and switch controlling red and green lights. Black finish. White lines.

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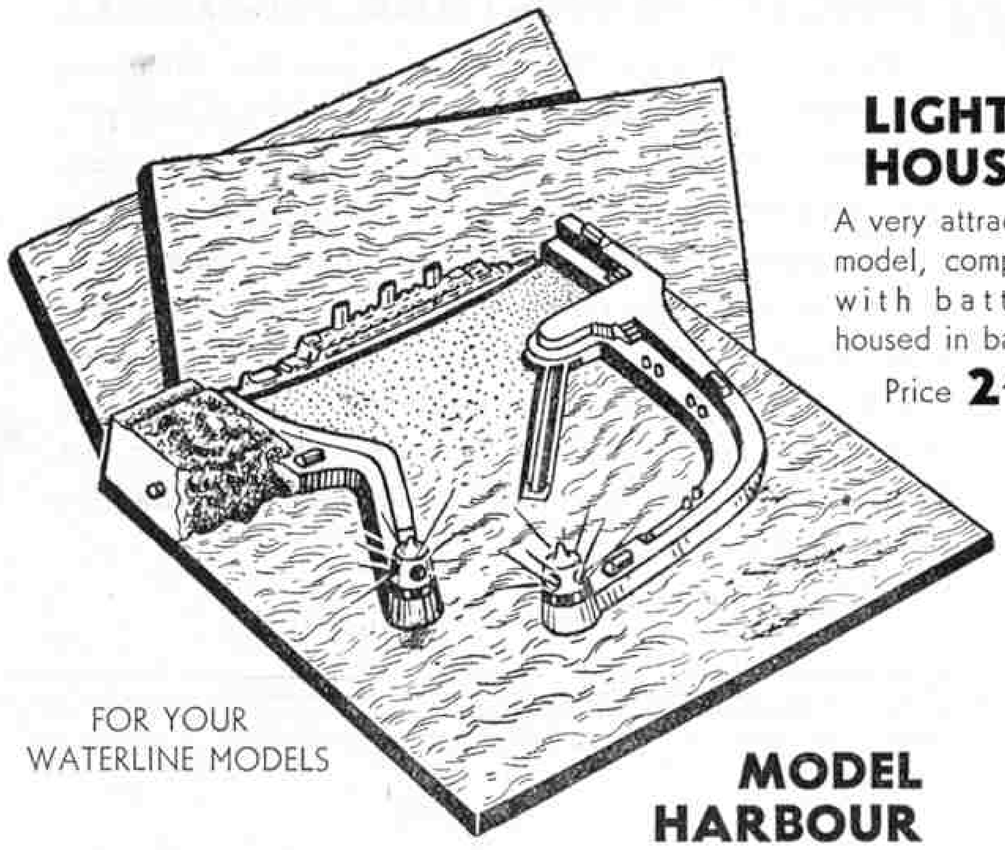

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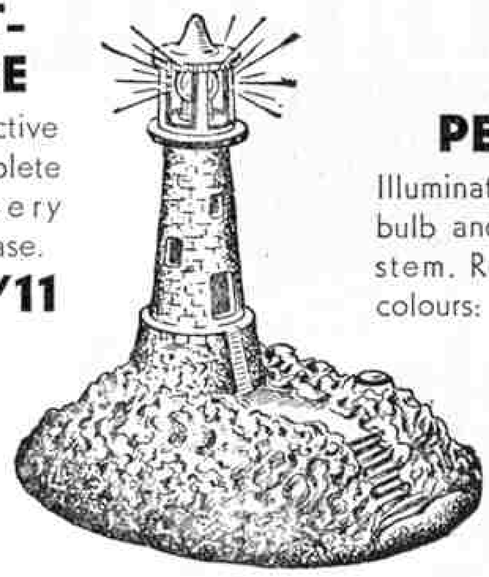


LIGHT-HOUSE

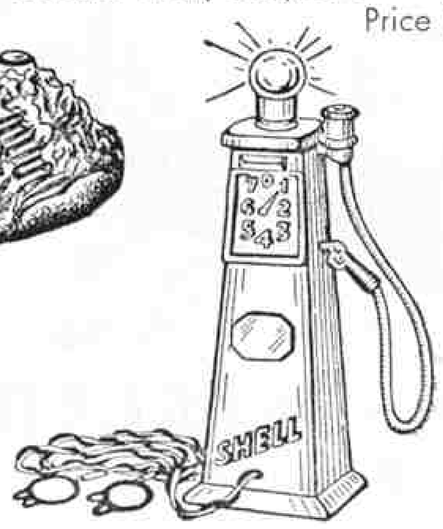
A very attractive model, complete with battery housed in base.

Price **2′11**

PETROL PUMPS

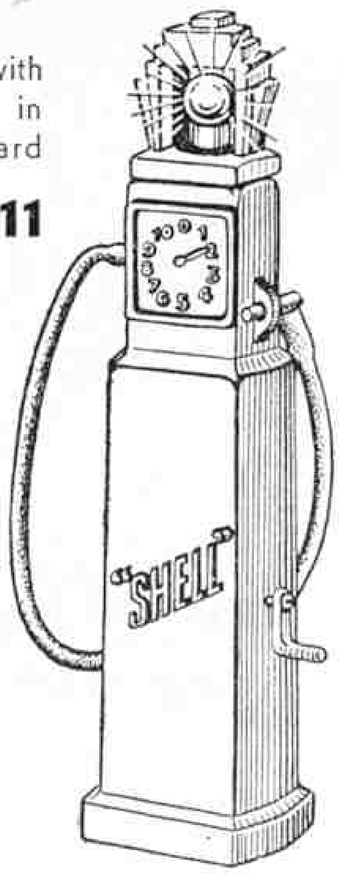
Illuminated Pumps 5¾ ins. high, with bulb and standard battery housed in stem. Rubber feed pipe. Standard colours: Shell, Esso, B.P.

Price **2′11**



Miniature Pump. Shell, Esso, B.P.

1′6



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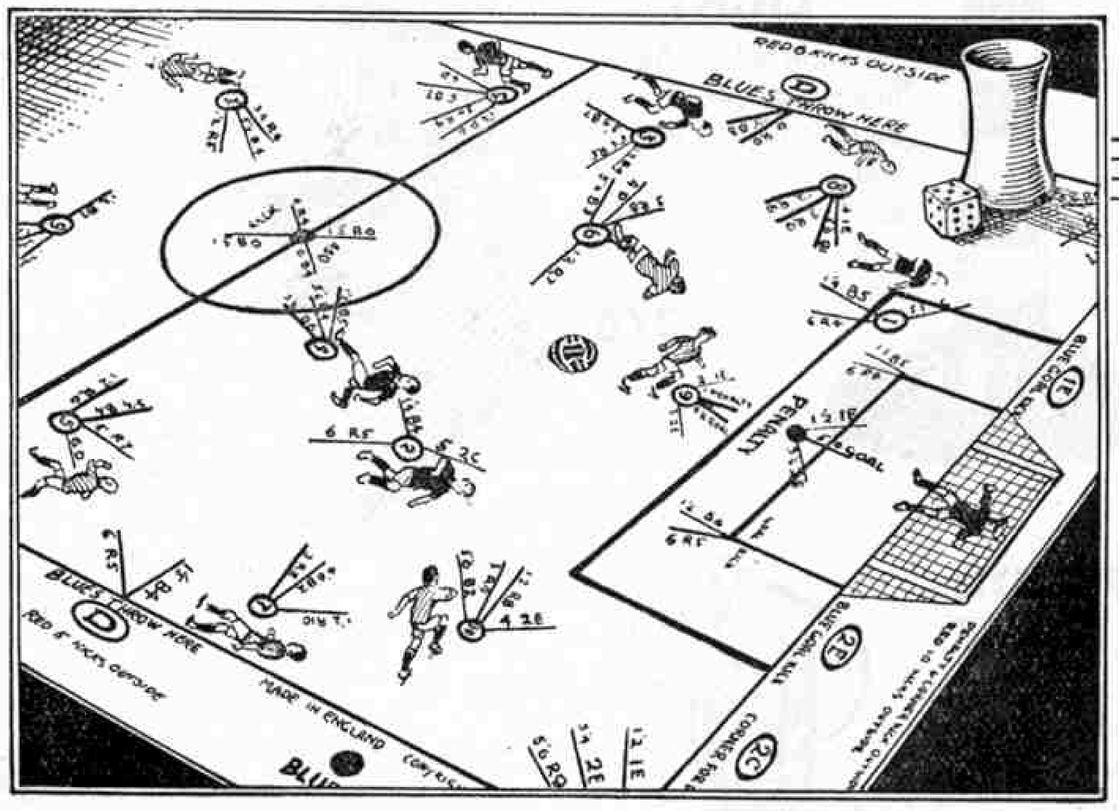
FIRESIDE FUN

FOOTBALL BY THE FIRESIDE—

FOOTBALLO. Here's a grand pastime, Boys, to brighten up the long winter evenings. **Footballo** is easily followed, for on face of the "playing pitch" are full instructions. Dice Box, Counters, and Dice are provided. The game opens on the throw of the Dice, and includes Throw-ins, Corners, Goal Kicks, and Penalties. **Footballo** can be played from an easy chair, for though the weather may be vile outside, the game still goes on, literally by your own fireside. **Footballo** is ideal for an evening's enjoyment, and great fun too. **Make sure you get one yourself** this Xmas.

MANUFACTURED IN GREAT BRITAIN

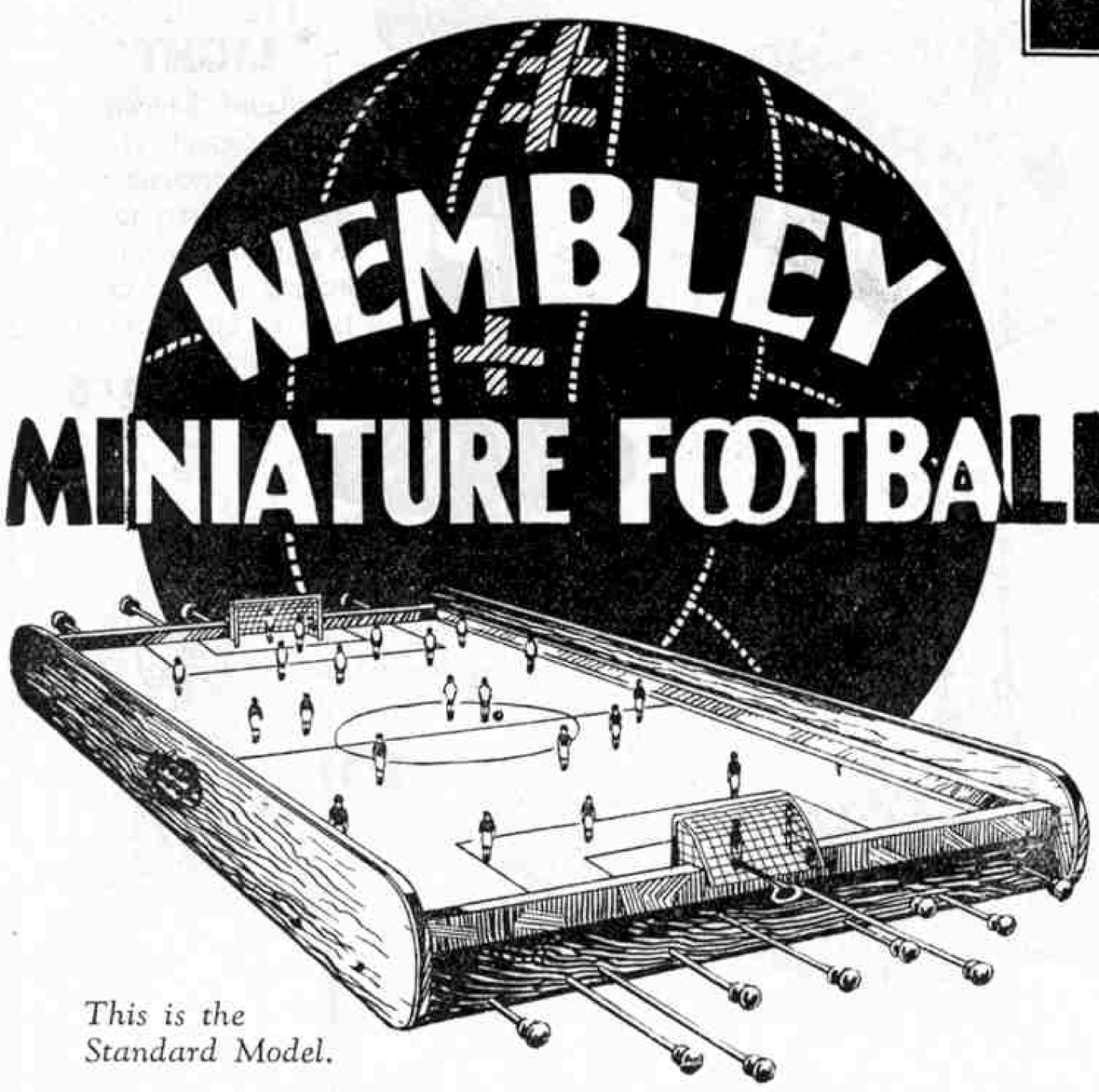


Super "de-Luxe" Set **5′-** (Postage 7d.)
Standard Set **2′6** (Postage 6d.)

"WEMBLEY" MINIATURE FOOTBALL

Another grand game that will give you the thrill and excitement of open-air football. The players actually play with the ball, run, swerve, pass, and kick for goal. Here again weather conditions count for nothing, for this is an indoor game, exciting, skilful, and packed with fun. There are two teams of coloured metal men, each under your own control. The models, beautifully coloured bright green and orange, are complete with full instructions. If you want to be the "Centre" of attraction this Xmas, don't fail to put **"Wembley" Miniature Football** on your list.

MANUFACTURED IN GREAT BRITAIN



This is the Standard Model.

Standard Model — Price **£1.1.0** (Carriage 1/3)
Junior Model — Price **10′6** (Carriage 9d.)

Obtainable at all leading

IN CASE OF DIFFICULTY WRITE TO—

BERWICK'S

FOR THE FAMILY!

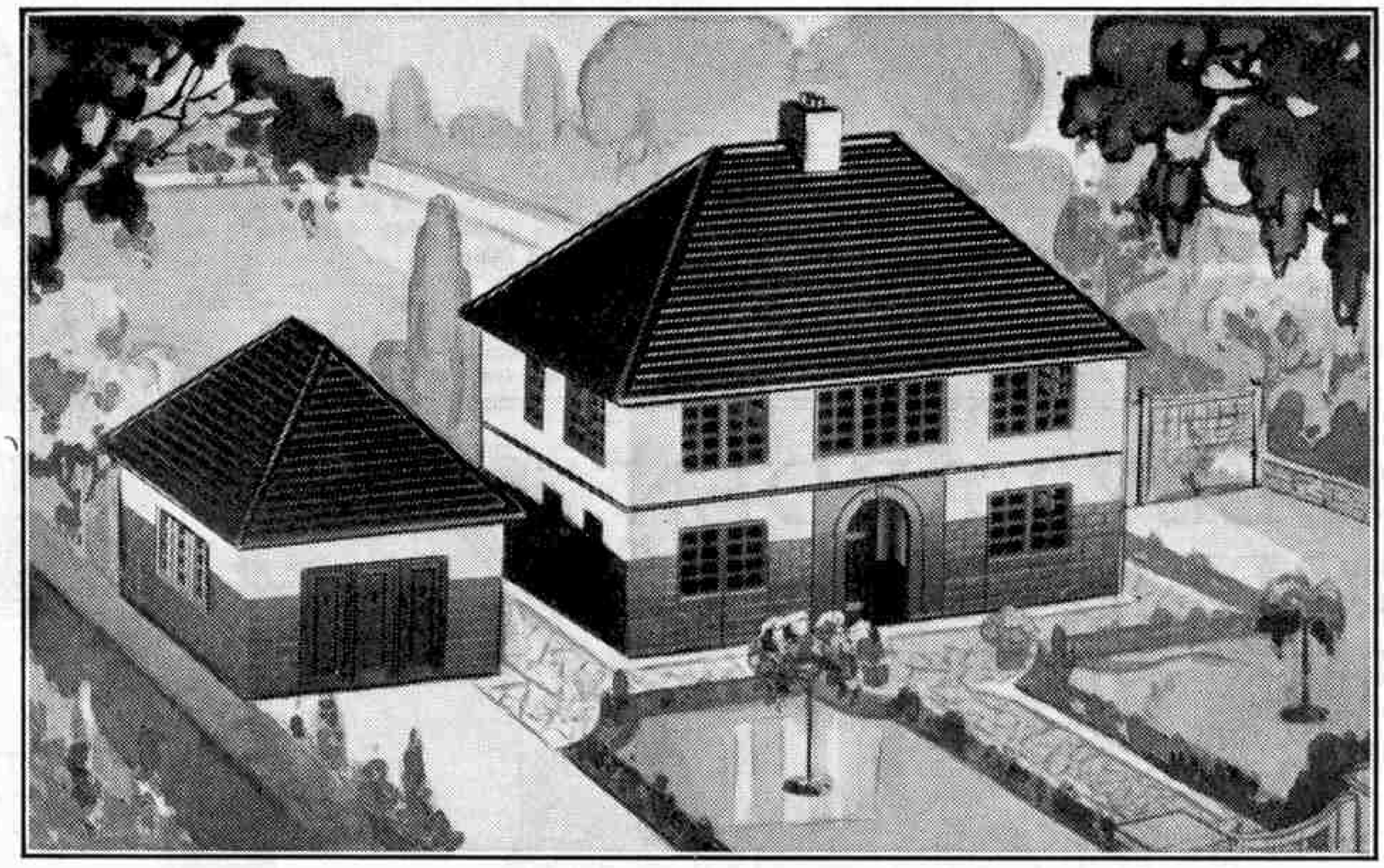
BAYKO

BAYKO. An old favourite and more popular than ever. An illustrated Book of Instructions is included with each Bayko Set. Here is the list of models that can be built:

LIGHT CONSTRUCTIONAL SETS

No. 1	Set	builds	36	Models	Price	7/6
No. 2	Set	„	60	„	„	10/6
No. 3	Set	„	120	„	„	15/-
No. 4	Set	„	300	„	„	21/-
No. 5	Set	„	600	„	„	30/-
No. 6	Set	over	700	„	„	42/-

These amazingly ingenious Constructional Sets are now famous. The range of models that can be built is astounding, for they include Castles, Garages, Houses, Railway Stations, and a host of other models. (The Double Storey House and Garage illustrated is built from a No. 5 Set.) The parts are beautifully coloured, realistic, and to scale, yet light and easy to handle. Commencing with the lowest priced Set at 7/6, you can, by means of **Converting Sets,** work up to the larger sizes. **"Build better with Bayko"** is a by-word among the thousands of boys who are already Bayko enthusiasts, for the Bayko Way of building has to be experienced to be appreciated. **You, too, must become a Bayko builder.**



Manufactured in Great Britain

Made throughout in Coloured Bakelite

Stores and Toy Dealers

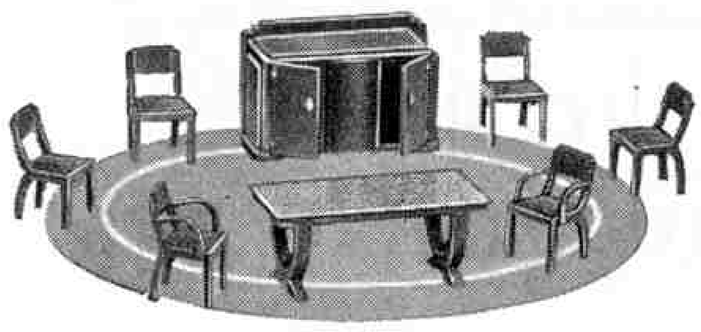
TOY CO. LTD.

SOUTH HUNTER STREET
LIVERPOOL, 1

Dinky Toys

DOLL'S HOUSE FURNITURE

A WONDERFUL SERIES OF ACTUAL SCALE MODELS

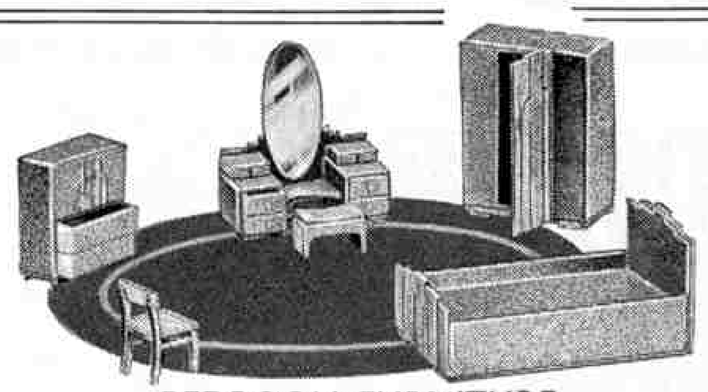


DINING-ROOM FURNITURE

Dinky Toys No. 101 Price of complete set 2/3

No. 101a.	Table	5d. each
No. 101b.	Sideboard (Opening doors)	9d. „
No. 101c.	Carver Chairs	3d. „
No. 101d.	Chairs	2d. „

Supplied in walnut brown finish only.

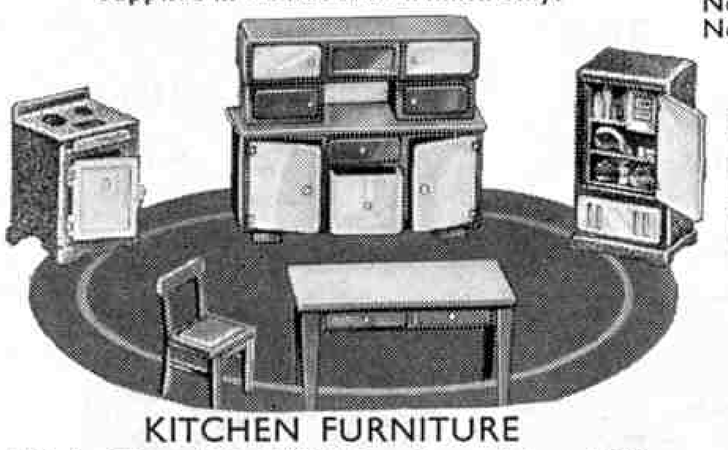


BEDROOM FURNITURE

Dinky Toys No. 102 Price of complete set 2/11

No. 102a.	Bed	6d. each
No. 102b.	Wardrobe (Opening door) ...	9d. „
No. 102c.	Dressing Table (Opening drawers)	10d. „
No. 102d.	Dressing Chest (Opening drawer)	6d. „
No. 102e.	Dressing Table Stool	2d. „
No. 102f.	Chair	2d. „

Supplied in colour or walnut brown finish.

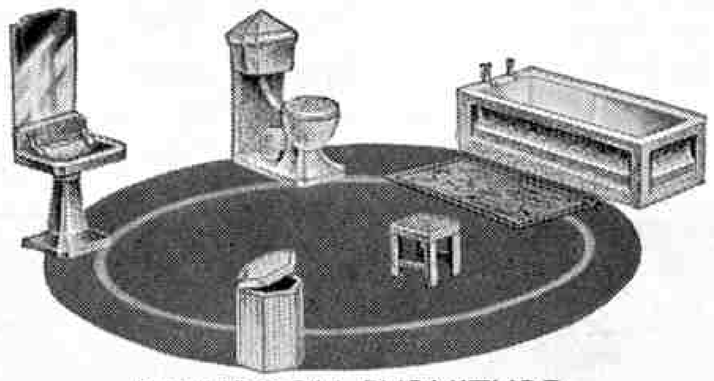


KITCHEN FURNITURE

Dinky Toys No. 103 Price of complete set 2/6

No. 103a.	Refrigerator (Opening Door)	8d. each
No. 103b.	Kitchen Cabinet (Opening doors and drawer) ...	10d. „
No. 103c.	Electric Cooker (Opening door)	6d. „
No. 103d.	Table	4d. „
No. 103e.	Chair	2d. „

Supplied in two colour schemes—light blue and white; light green and cream.



BATHROOM FURNITURE

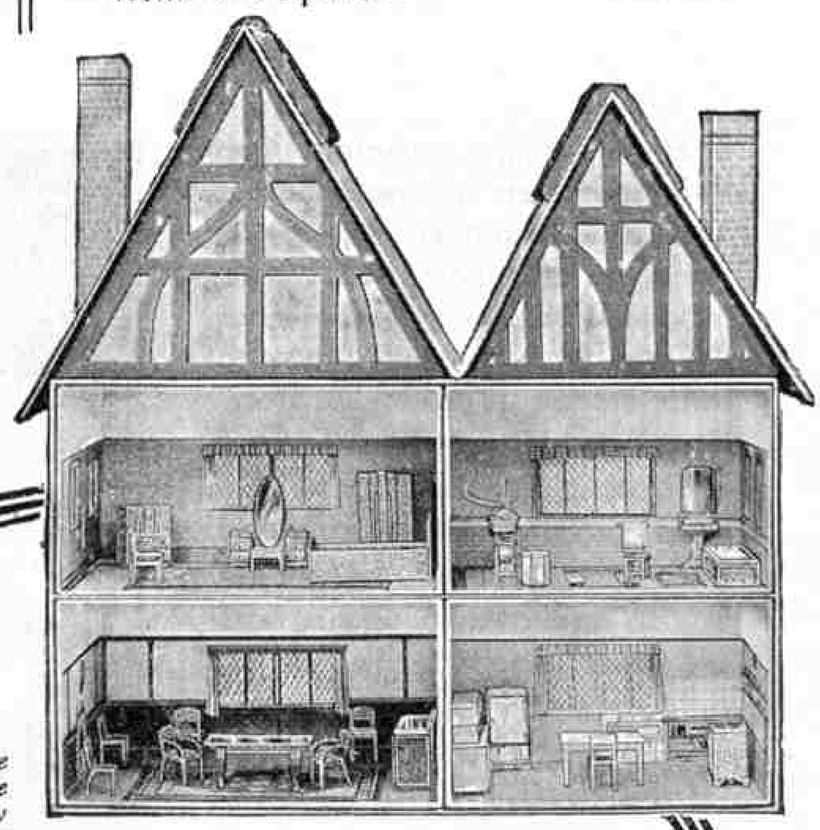
Dinky Toys No. 104 Price of complete set 2/–

No. 104a.	Bath 6d. each	No. 104b.	Bath Mat 1d. each
No. 104c.	Pedestal Hand Basin		6d. „
No. 104d.	Stool		2d. „
No. 104e.	Linen Basket (Opening lid)		... 4d. each
No 104f.	Toilet (Lifting lid) ...		... 6d. each

Supplied in two colour schemes—pink and white; light green and white.

The jolly Doll's House Furniture that forms a special extension of the range of Dinky Toys has gained wonderful popularity. Every piece is a perfect miniature scale model based on a typical example of modern design, and with a beauty of finish that must be seen to be appreciated. All are made to a scale of 7/16th of an inch to one foot, which is as nearly as possible 1/27th full size. The different items of the four complete suites—dining-room, bedroom, bathroom and kitchen—are fascinating to handle, and there is a real thrill in manipulating the tiny opening doors and drawers.

Each of the suites can be bought either as a complete set or in separate items. It is thus possible to increase the size of any one set by adding more chairs or other items as required.



This back view of the Doll's House shows the four suites of Dinky Toys Doll's House Furniture tastefully arranged in position.

"DOLLY VARDEN" DOLL'S HOUSE

FOR DINKY TOYS FURNITURE

THE IDEAL GIFT FOR GIRLS

The "Dolly Varden" Doll's House provides a perfect setting for the Dinky Toys Doll's House furniture.

The exterior of the house is designed to represent a half-timbered dwelling, while the interior decorations, which are printed in nine colours, are in an attractive modern style.

Reinforced leather board is the material of which the house is constructed, and although it is collapsible it is as strong as a wood structure when set up. The container, which also is made of reinforced leather board, opens out to show a lovely garden with Tennis Lawn, Carriage Drive, and Rockery, providing an exquisite setting for play with Dinky Toys and Hornby Trees, Hedging, etc. The arrangement of the Dinky Toys Furniture, shown in the illustration on the right is intended only as a suggestion. Great fun is to be had from re-arranging the various items, perhaps on the lines of some familiar real rooms.

Price of "Dolly Varden" Doll's House—4/11

DIMENSIONS

The following are the overall dimensions of the "Dolly Varden" Doll's House when built up ready for play. Length, 1 ft. 6¾ in. Depth, 10¼ in. Height, 1 ft. 6¾ in.

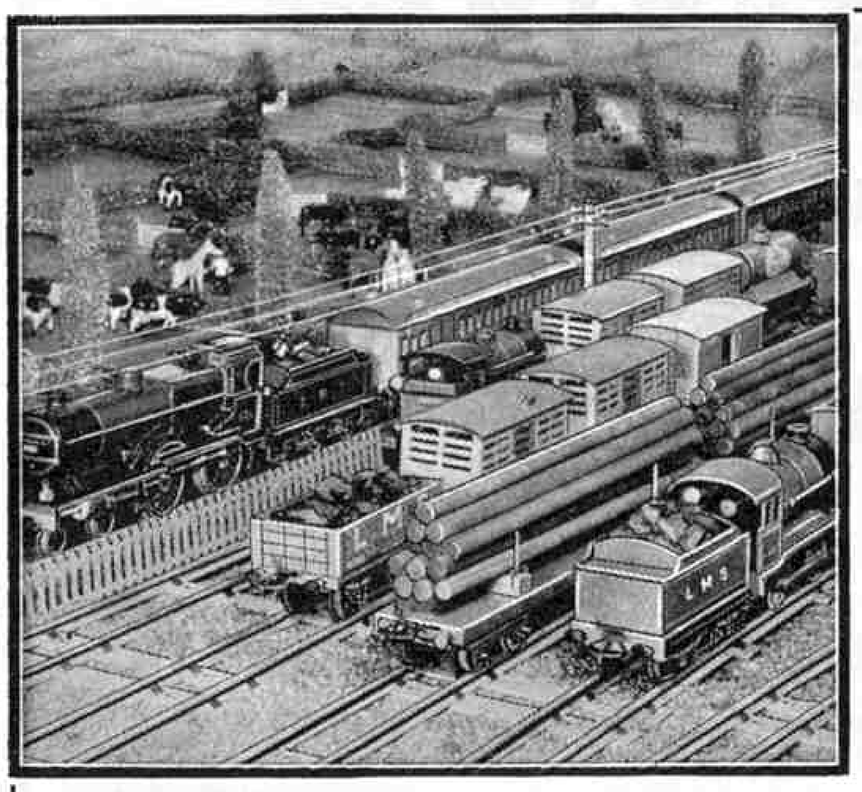
The open container on which the house stands measures 3 ft. 3½ in. by 2 ft. 5½ in.

When the house is dismantled and packed in container, the overall dimensions of the complete parcel are ¾ in. x 1 ft. 7½ in. x 2 ft. 5½ in.

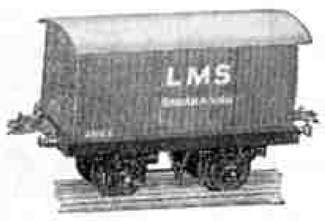
The Couch Hammock, Tennis Net, Garden Seats, Dinky Toys Garage, Motor Cars and Figures, and the Hornby Trees and Hedging featured in the illustration on the left are not included with the Doll's House and Garden.

MECCANO LTD. - BINNS ROAD - LIVERPOOL 13

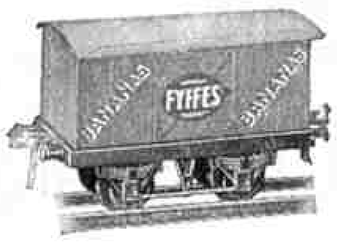
HORNBY ROLLING STOCK



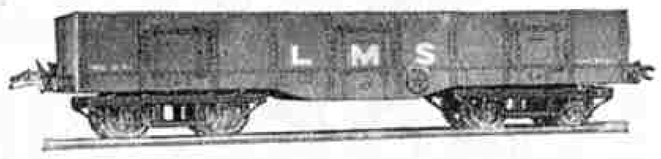
The Hornby Series includes a splendid range of realistic Rolling Stock. Each item is **fitted with patented** and exclusive automatic couplings, a special feature that places it in a class entirely of its own. There are Pullman Cars, Passenger Coaches, Guards' Vans, Tipping Wagons, Lumber Wagons, and many other types, all beautifully finished.
An attractive selection of Hornby Rolling Stock is illustrated and described on this page. Ask your dealer for a complete price list.



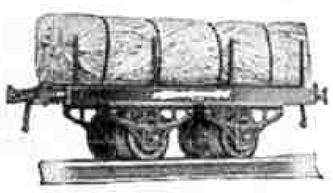
No. 0 BANANA VAN
Lettered L.M.S. only.
Price **1/6**



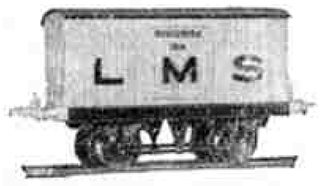
No. 1 BANANA VAN "FYFFES"
Sliding doors.
Price **2/3**



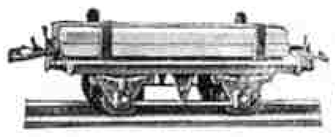
No. 2 HIGH CAPACITY WAGON
Finished in correct colours of G.W. and L.M.S. "Loco Coal" Wagons, or L.N.E.R. "Brick" Wagon. Not suitable for 1 ft. radius rails.
Price **3/9**



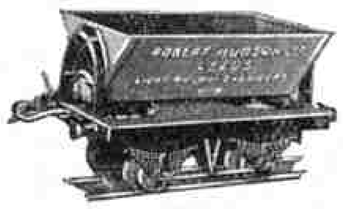
FIBRE WAGON
This is an interesting model of a type of wagon used in France and other European countries.
Price **1/3**



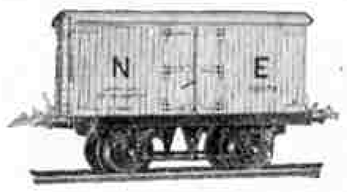
***REFRIGERATOR VAN No. 1**
Finished in white. With sliding doors.
Price **2/3**



No. 1 TIMBER WAGON
Beautifully enamelled in yellow and red.
Price **1/3**

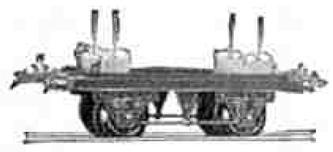


No. 1 SIDE TIPPING WAGON
Excellent design and finish. Lettered "Robert Hudson Ltd."
Price **1/9**

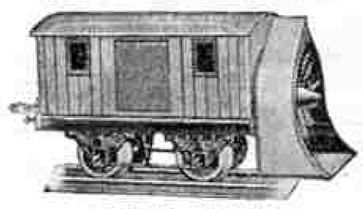


No. 0 REFRIGERATOR VAN
Lettered L.M.S., G.W., N.E. and S.R. Finished in white with the appropriate details.
Price **1/6**

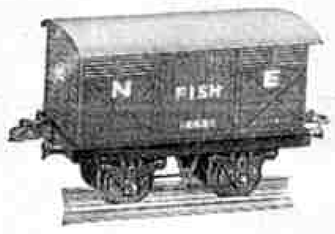
***OPEN WAGON "B"**
Fitted with centre tarpaulin-supporting rail.
Price **2/-**



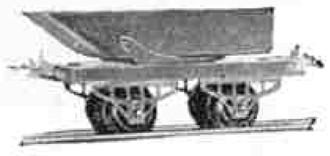
No. 1 LUMBER WAGON
Fitted with bolsters and stanchions for log transport.
Price **1/3**



SNOW PLOUGH
With revolving plough.
Price **3/6**



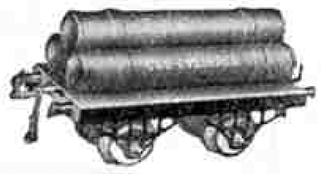
No. 0 FISH VAN
Lettered L.M.S., G.W. and N.E.
Price **1/6**



No. 0 ROTARY TIPPING WAGON
Container revolves and tips.
Price **1/6**

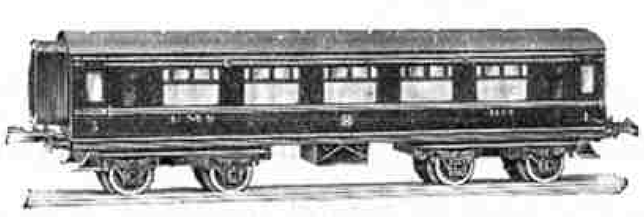
***No. 1 WAGON**
Price **1/6**

***HOPPER WAGON**
Mechanically unloaded.
Price **2/9**

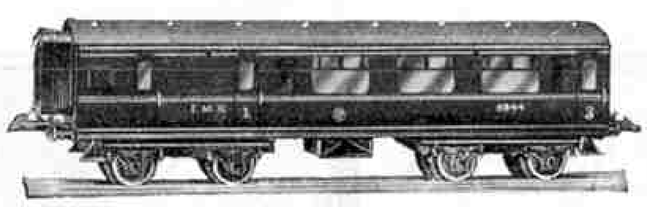


GAS CYLINDER WAGON
Finished in red, lettered gold.
Price **1/6**

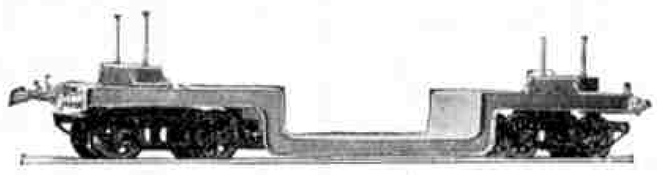
CEMENT WAGON
The door at the top opens. Finished in yellow. Lettered "Blue Circle" Portland Cement.
Price **1/11**



No. 2 CORRIDOR COACH
L.M.S. First-third. Not suitable for 1 ft. radius rails.
Price **7/6**

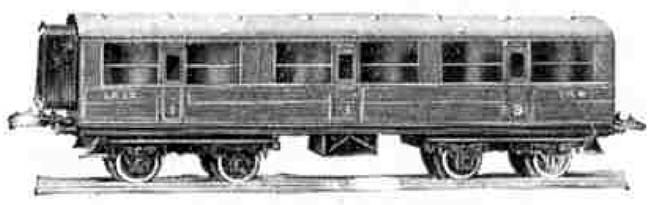


No. 2 CORRIDOR COACH
L.M.S. Brake-composite. Not suitable for 1 ft. radius rails.
Price **7/6**

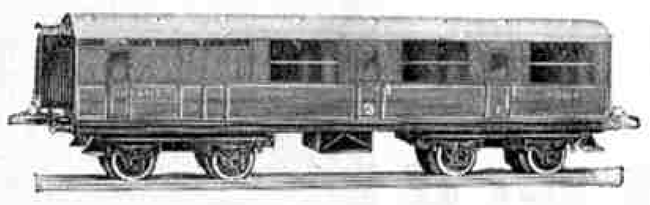


TROLLEY WAGON
Not suitable for 1 ft. radius rails.
Price **3/9**

TROLLEY WAGON
Fitted with two Cable Drums.
Price **4/3**



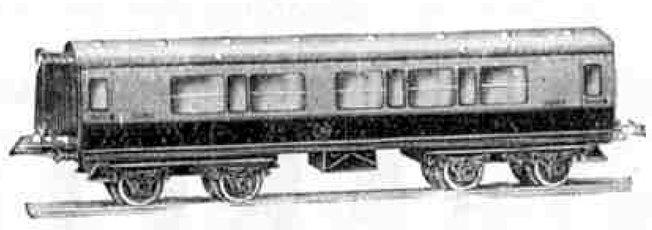
No. 2 CORRIDOR COACH
L.N.E.R. First-third. Not suitable for 1 ft. radius rails.
Price **7/6**



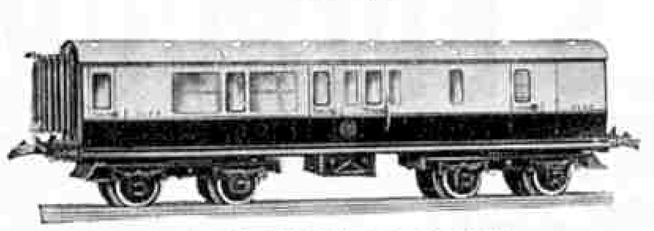
No. 2 CORRIDOR COACH
L.N.E.R. Brake-composite. Not suitable for 1 ft. radius rails.
Price **7/6**

OIL TANK WAGON "MOBILOIL"
Finished in battleship grey.
Price **1/11**

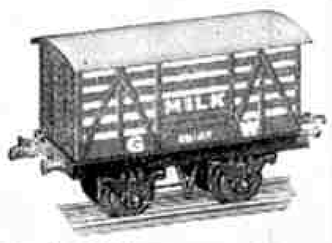
No. 1 PETROL TANK WAGON. "SHELL-B.P."
Price **1/11**



No. 2 CORRIDOR COACH
G.W. First-third. Not suitable for 1 ft. radius rails.
Price **7/6**

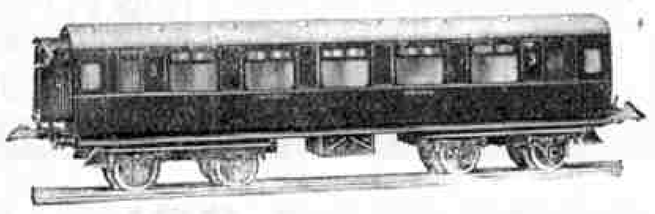


No. 2 CORRIDOR COACH
G.W. Brake-composite. Not suitable for 1 ft. radius rails.
Price **7/6**



No. 0 MILK TRAFFIC VAN
An attractive model. Available lettered G.W. only.
Price **1/6**

CHOCOLATE VAN "CADBURY'S"
This van is beautifully enamelled in blue with white roof.
Price **2/3**



No. 2 CORRIDOR COACH
S.R. Third-class. Not suitable for 1 ft. radius rails.
Price **7/6**

Lettered L.M.S., N.E., G.W. or S.R.

MECCANO LTD., BINNS ROAD, LIVERPOOL 13

LORD KELVIN, the great scientist, wrote:

"I am glad to say that I find your Seccotine very useful for many ordinary purposes and for scientific models."

FATHER writes:

"My dear boy,

I am pleased to note that your reports for half term are good. During the holidays why not devote your spare time to model making? And if you do this, take my advice and use Seccotine such as Lord Kelvin used as long ago as 1896. There is nothing so permanently strong as Seccotine for making or mending articles of all surfaces.

Yours ever, Dad.

P.S. Seccotine is sold everywhere in pin-stopper tubes, complete with directions for use, 4½d., 6d. and 9d."

SECCOTINE REGD.

The Double Strength ADHESIVE

POST THIS COUPON to Dept. M

M'CAW, STEVENSON & ORR LTD., BELFAST

I should like to have, post free, copies of your Free Booklets which describe the many uses for Seccotine.

Name .....

Address .....

SKYBIRDS

latest & best achievement!

★THE WESTLAND "LYSANDER"

Constructional Kit complete with blue print, price 5/-

Completed Model, price 12/6

SKYBIRD Modelling, assisted by the SKYBIRD LEAGUE, has become a National Hobby.

SKYBIRD Aeronautical MODELS and Accessories are ALL BRITISH productions.

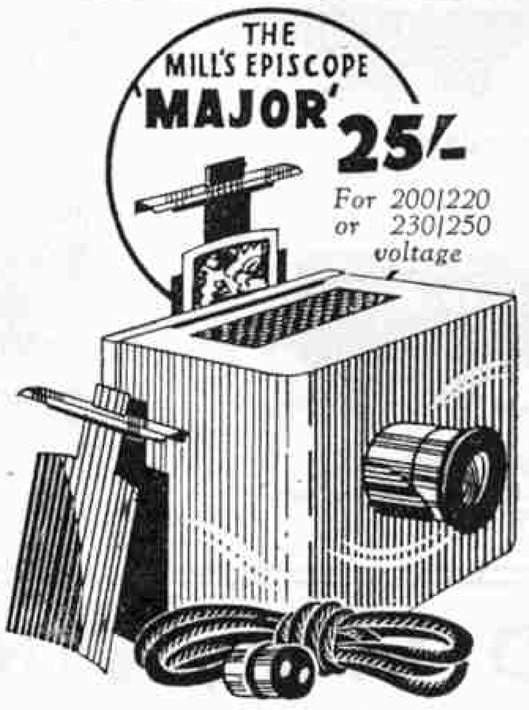
The first ½nd scale series of Aeronautical Models, introduced in 1932 and STILL the most popular to-day.

Write for illustrated leaflet, the story of the SKYBIRD LEAGUE and latest list of productions.

SKYBIRDS (Desk B), 3, Aldermanbury Avenue, London, E.C.2.

SUMMER HOLIDAYS lived over again on a

MILL'S EPISCOPE



MAKE a cinema show of your holiday snaps by *projecting* them as brilliant pictures, size 36 in. x 27 in., by means of the Mill's Episcope "Major," the wonderful machine which reproduces on a screen distortionless enlargements of any *opaque* objects such as photoprints, coloured pictures, cigarette cards, microscope slides, sketches, etc., without any special preparation.

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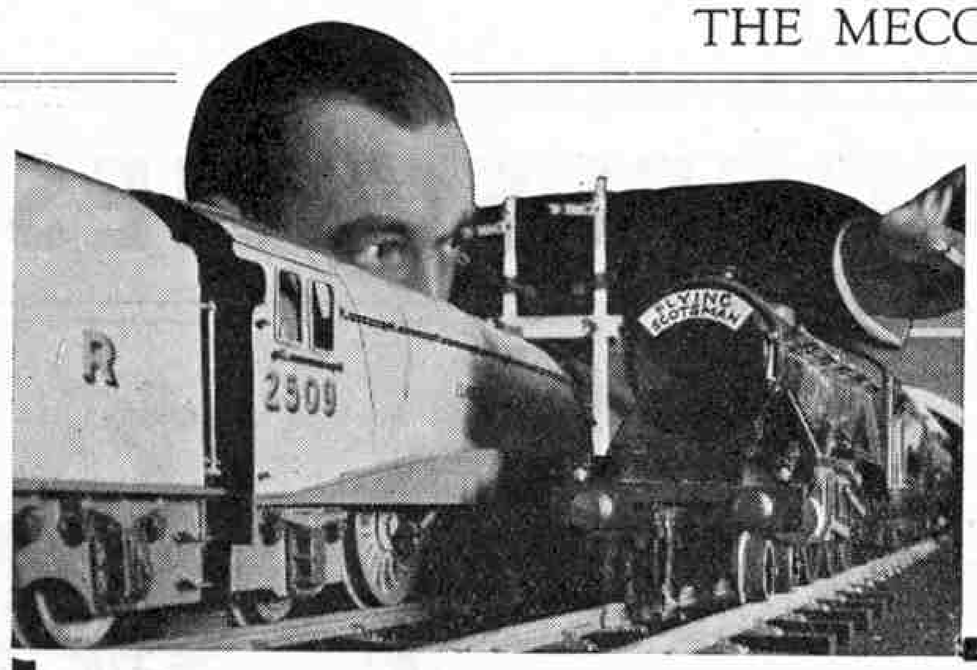

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which together make the most useful hobby a man or boy could ever take up—**MODEL ENGINEERING!** We "cover" every model Problem from "A" to "Z". Take Model Railways. To-day there is a more varied selection in size and detail than ever before. This summer has seen Bassett-Lowke experts working overtime on new ideas, to bring out smart productions for you at Christmas time.

Throughout October their new Railway Catalogue has been in preparation, and it comes fresh from the printers on **November 3rd.** NEW A.17 **6d.** POST FREE. WRITE **NOW** FOR IT!

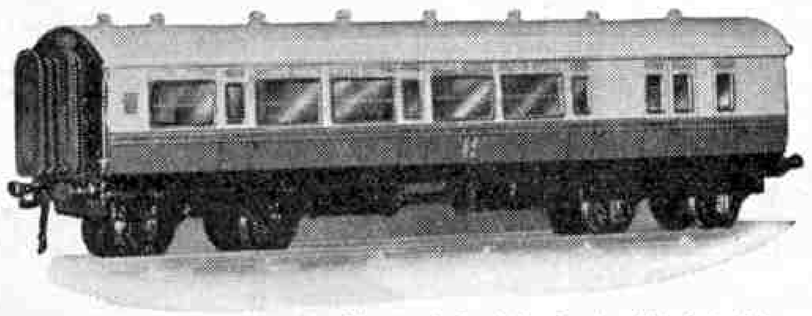
A NEW MODEL!

The new BASSETT-LOWKE Tank for this season. 0-6-0 in three finishes: S.R. L.M.S., and L.N.E.R. Fine value. Clockwork **37/6,** Electric d.c. **42/-** d.c. spur drive **52/6,** a.c. **46/-.** Gauge "O."

TIP TOP VALUE!

Fresh from the factory, ready to run on some smart model layout. Fine value 0-6-0 Goods Locomotive. Gauge "O" in L.M.S. or L.N.E.R. colours. Clockwork **28/6,** Electric d.c. **35/-,** d.c. spur drive **42/-,** a.c. **39/-.**

Passenger Rolling Stock



Smart coaches, 1st Class Corridor and Corridor Brake Third, in S.R., G.W.R., L.N.E.R., or L.M.S. Length overall 13 in. Gauge "O," **14/6** each. With special B.L. bogie No. 612 and Cast Iron wheels, **5/-** extra.

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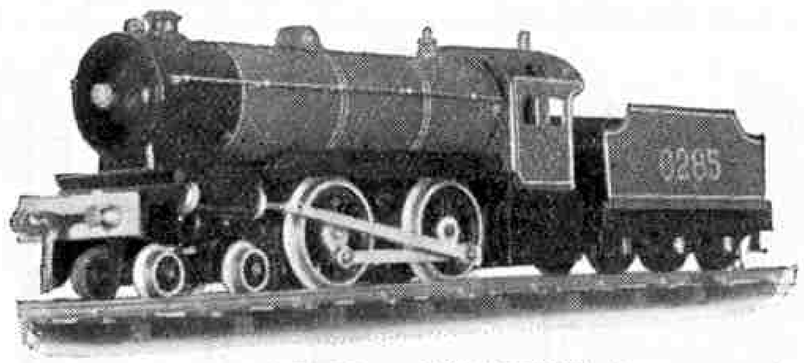
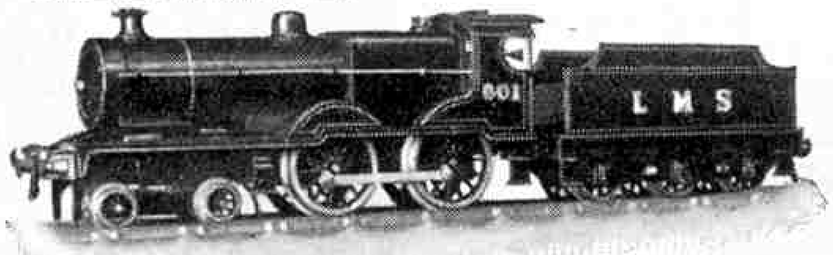


For those who love the thrill of Steam, "ENTERPRISE" is the most popular gauge "O" steam locomotive for working and hauling capacity of any commercial production. STEAM **50/-.**
Also ready before Christmas, the Super "ENTERPRISE," **77/6.**

THE SMART 2P



An inexpensive locomotive capable of traversing sharp curves, and a "good looker." Clockwork **42/-,** Electric d.c. **42/-,** d.c. spur drive or a.c. **58/6.** Gauge "O."

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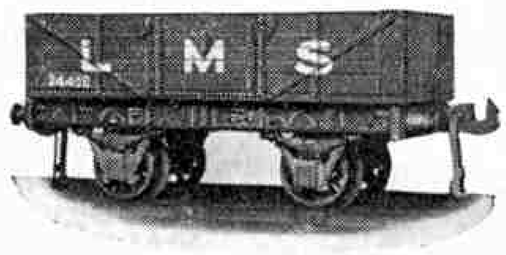

Open wagons, all companies, now offered at **2/6.** Covered Wagons **3/-.** No change in the smartness and value of these gauge "O" vehicles. Every type catalogued in A.17. Get your copy!

The TWIN TRAIN Table Railway

"The Greatest Little Train in the World" goes from strength to strength. New productions and new prices for this season, so you must get the latest folder. **T.T.17**

Send for both T.T.17 ("OO" gauge) and F.B.17 ("O" gauge) and then you will be right "up-to-date" with Model Railways

NORTHAMPTON'S Shipyard is hard at work on Ship Model Christmas presents. Latest idea is their 12/6 set of parts for building smart waterline models like the "CUTTY SARK" or the "QUEEN MARY." Send for Waterline Booklet No. 17.

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For the man who makes his own models, B.17 is a very necessary book to have. Castings, Parts, Drawings, Fittings, Nuts, Bolts, etc., are catalogued in full, as well as finished models, sets of parts and plants.

B.17 contains a dozen pages of useful up-to-date drawings and covers every want of the Model Engineer. 6d. post free.

TO REMIND YOU

Here are all the BASSETT-LOWKE publications mentioned on this page:

New **A.17** Model Railway Catalogue	**6d.**
Latest **S.17** Model Ship Catalogue	**6d.**
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ALSO AVAILABLE:

No. 17 Laying Permanent Way	**2d.**
No. 17 How to build a Traction Engine	**3d.**

Why not cut out this coupon (putting a "X" against those you would like) and send to BASSETT-LOWKE.

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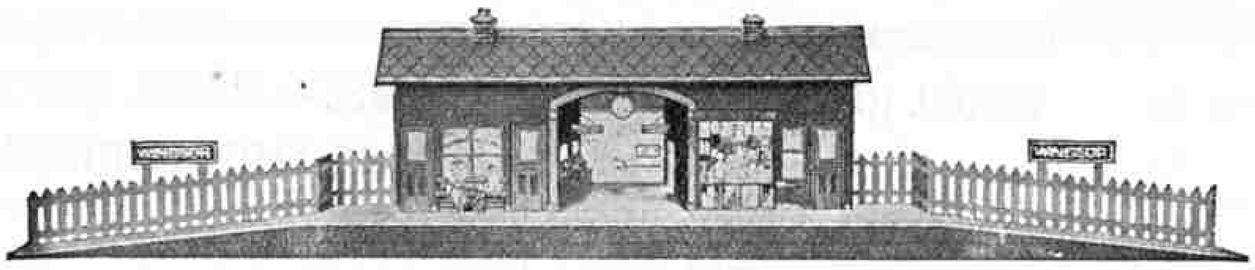
HORNBY ACCESSORIES

There is a splendid range of Railway Accessories in the Hornby Series, each one built in perfect proportion and beautifully finished. With these realistic accessories the most elaborate model railway may be constructed and operated in exactly the same manner as a real railway.

A selection of Hornby Accessories is shown on this page. Ask your dealer to show you the full range.



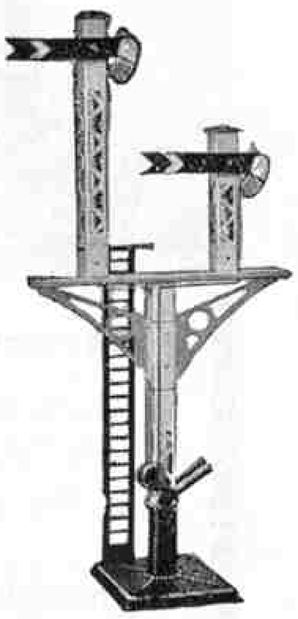
No. 2 STATION
Built up with three detachable sections. Named "Margate," "Wembley," "Ripon," or "Reading." Length 2 ft. 9 in., breadth 6 in., height 7 in. ... ... Price **8/–**

No. 2E STATION
This Station is fitted for electric lighting, otherwise it is the same as No. 2 Station, illustrated above. Price **9/3**

No. 4 STATION
Similar to No. 2 Station for dimensions and style but of an improved design, more strikingly coloured, and with accessible Booking Hall and Ticket Office Barrier ... ... Price **9/–**

No. 4E STATION
This Station is fitted for electric lighting, otherwise it is the same as No. 4 Station ... ... Price **10/3**

No. 2 SIGNAL, DOUBLE ARM
"Home" and "Distant."
Price **2/3**

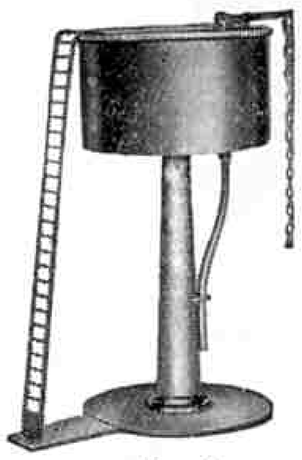


No. 2 JUNCTION SIGNAL
"Home" or "Distant." Signal arms operated by levers at base. A very realistic model. Price **4/6**

No. 1 SIGNAL GANTRY
"Home" or "Distant."
Price **3/11**

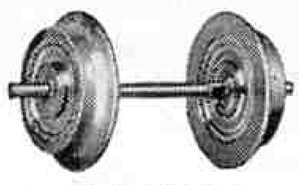
No. 1 WATER TANK
Height 7 in.
Fitted with flexible tube and valve lever.
Price **2/6**

TELEGRAPH POLES
Price per pair **3/–**

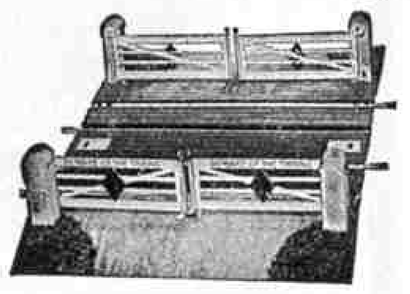


No. 2 WATER TANK
Height 9 in.
Fitted with flexible tube and valve lever.
Price **5/9**

GRAPHITE GREASE
For Springs.
Price per tube **6d.**

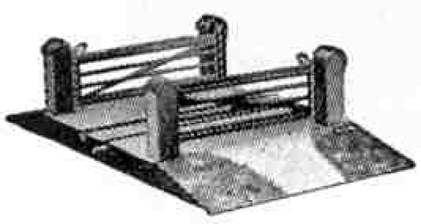


MANSELL WHEELS
These solid die-cast Wheels can be fitted to Hornby Coaches, Vans, etc.
Price per pair **3d.**



No. 2 LEVEL CROSSING
Measures 13½ x 10½ in., with two tracks of gauge O rails in position.
Price **4/11**

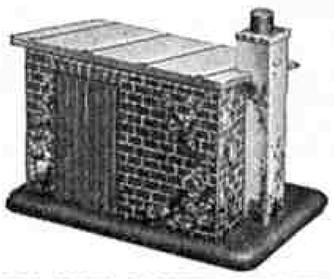
No. E2 LEVEL CROSSING (Electrical)
Similar to Level Crossing No. 2 excepting that a third rail is fitted in each of the two tracks.
Price **6/11**



No. 1 LEVEL CROSSING
Suitable for a single track only.
Price **2/11**

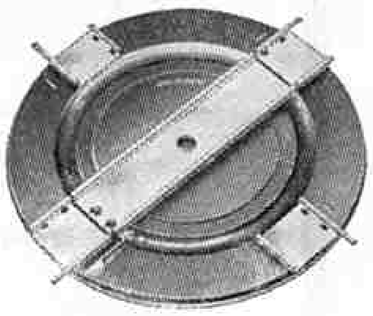
No. E1 LEVEL CROSSING (Electrical)
Similar to No. 1 Level Crossing, but fitted with electrical track.
Price **3/9**

No. 1 SIGNAL CABIN
Finished in colours.
Price **2/6**



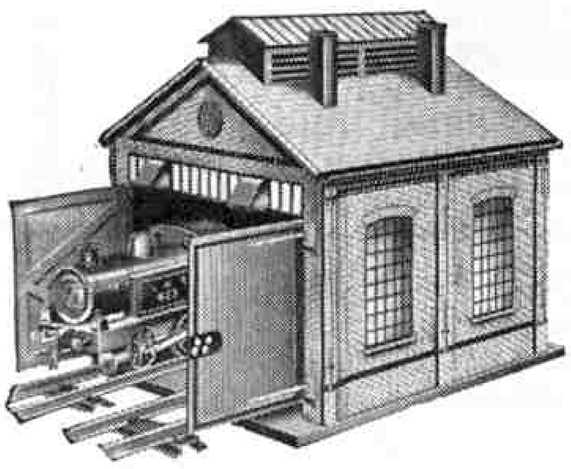
PLATELAYER'S HUT
Price **1/–**

No. 2 SIGNAL CABIN
Dimensions: Height 6½ in., width 3½ in., length 6½ in. Roof and back open to allow Lever Frame to be fitted inside cabin if desired. Price **3/6**



No. 1 TURNTABLE
Price **1/11**

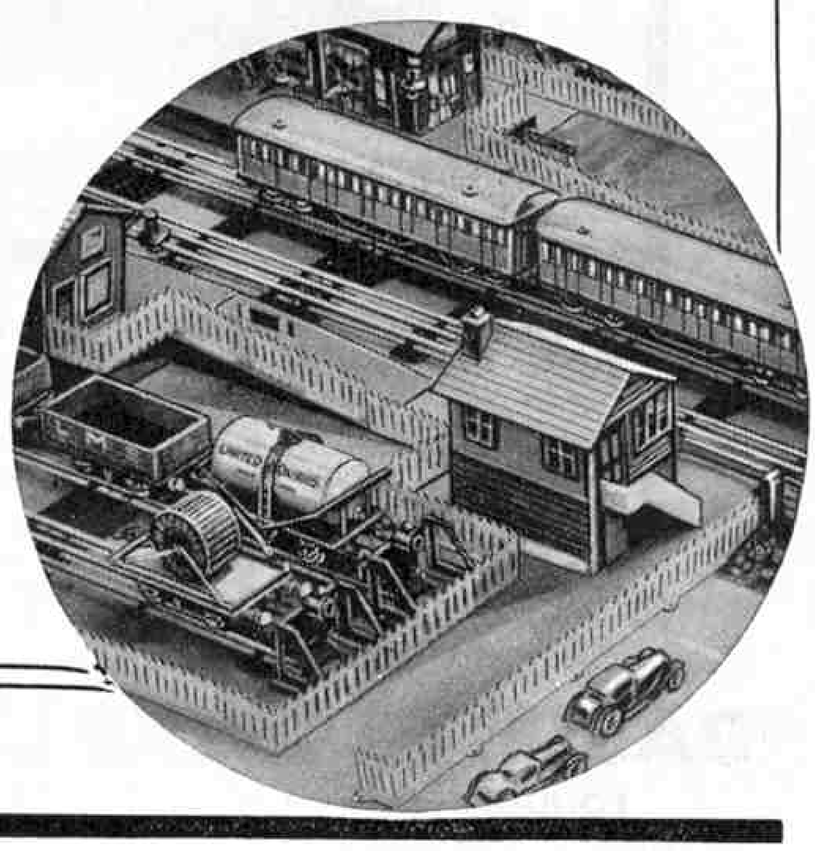
VIADUCT Price **5/11** **VIADUCT (Electrical)** Price **7/6**
VIADUCT Centre Section only ... ... Price **4/–**
VIADUCT (Electrical) Centre Section only ... Price **4/6**



No. 1 ENGINE SHED
This Shed will accommodate any Locomotive and Tender with an overall length not exceeding 8¾ in. Price **13/9**

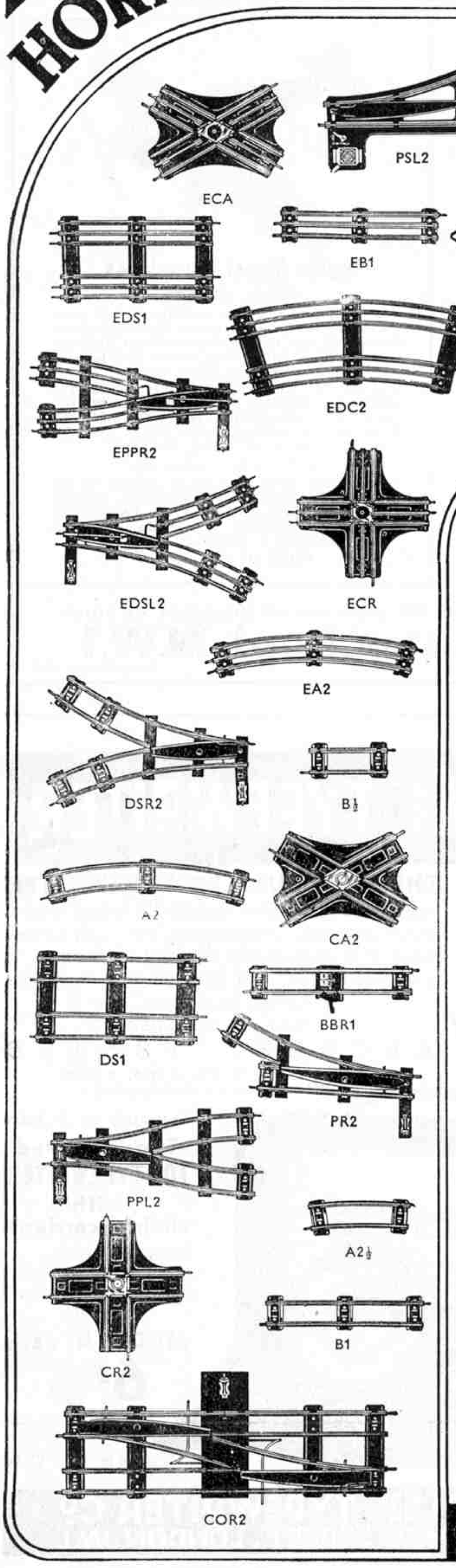
No. 1 STATION
Length 16¾ in., width 6 in., height 6 in. ... ... Price **4/6**

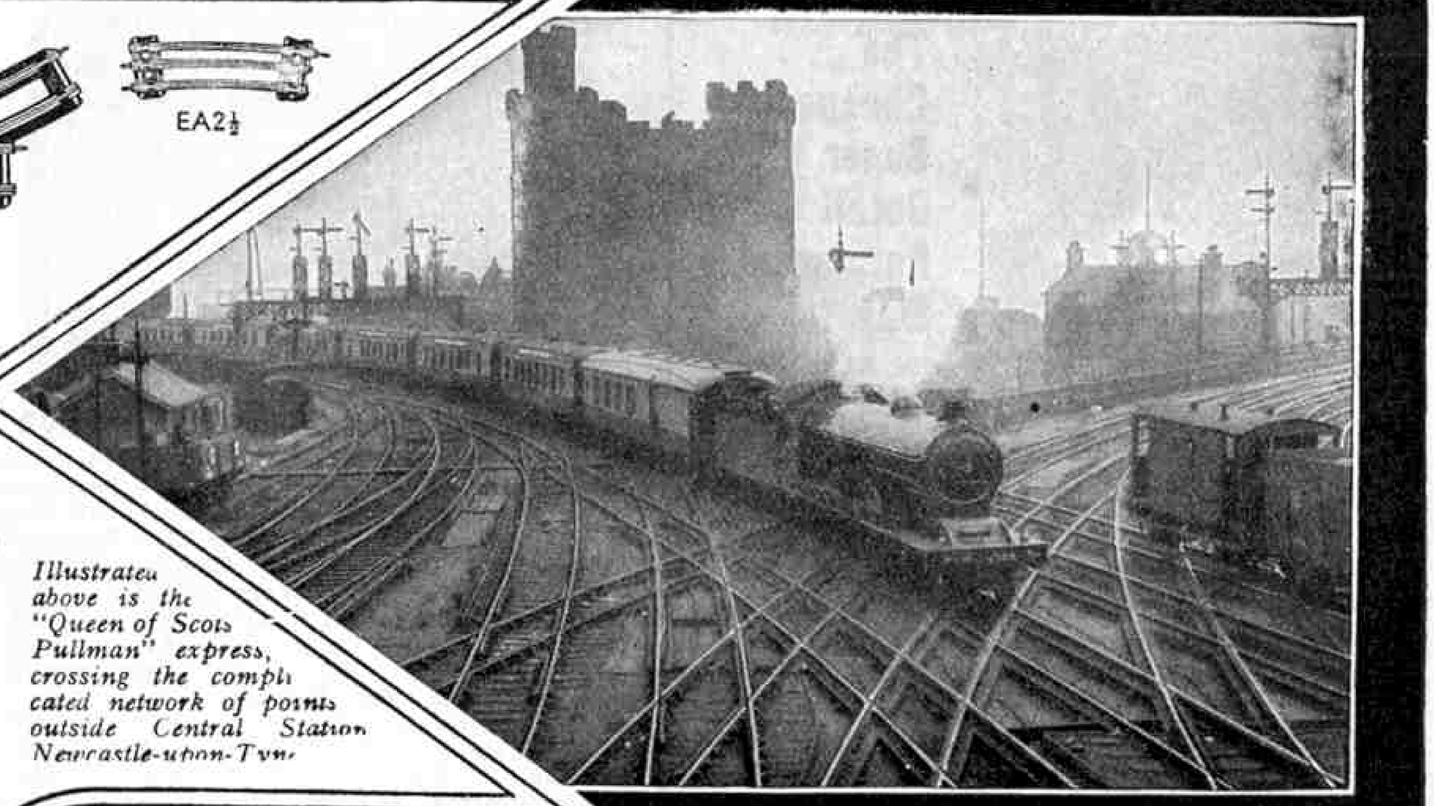
No. 3 STATION
Similar to No. 1 Station for dimensions and style, but of an improved design, more strikingly coloured. Price **5/6**



MECCANO LTD., LIVERPOOL 13

HORNBY RAILS, POINTS AND CROSSINGS





Illustrated above is the "Queen of Scots Pullman" express, crossing the complicated network of points outside Central Station Newcastle-upon-Tyne

There is practically no limit to the number of rail formations that can be built with Rails, Points and Crossings. A supply of Rails is included in every Hornby Train Set, but the owner is certainly not getting the best out of his set if he is satisfied with merely running it round a simple oval track. The addition of extra Rails and of Points and Crossings to his equipment lends a delightful realism to the game and greatly enhances the fun.

Rails for Electric Trains, Gauge 0, 1¼"

CURVED RAILS

1-ft. Radius

EA1	Curved rails	... per doz.	5/–
EA1½	Curved half rails	... „	4/6
EA1¼	Curved quarter rails	... „	4/–

2-ft. Radius

EA2	Curved rails	... per doz.	5/–
EA2½	Curved half rails	... „	4/6
EA2¼	Curved quarter rails	... „	4/–
EDC2	Curved rails, double track ...	½ doz.	9/–

STRAIGHT RAILS

EB1	Straight rails	... per doz.	5/–
EB½	Straight half rails	... „	4/6
EB¼	Straight quarter rails	... „	4/–
EDS1	Straight rails, double track ...	½ doz.	8/6

POINTS

For 1-ft. Radius Curves

EPR1	Right-hand points	... ...	per pair 5/9
EPL1	Left-hand points		

For 2-ft. Radius Curves

EPR2	Right-hand points	... ...	per pair 7/6
EPL2	Left-hand points		

CROSSINGS

ECA	Acute-angle crossings	each	2/6
ECR	Right-angle crossings	„	2/6

DOUBLE SYMMETRICAL POINTS

For 1-ft. Radius Curves

EDSR1	Double symmetrical points, right-hand,	
EDSL1	Double symmetrical points, left-hand,	per pair 6/–

For 2-ft. Radius Curves

EDSR2	Double symmetrical points, right-hand,	
EDSL2	Double symmetrical points, left-hand,	per pair 7/–

PARALLEL POINTS

EPPR2	Parallel points, right-hand	per pair 7/–
EPPL2	Parallel points, left-hand	

CROSSOVER POINTS

ECOR2	Crossover points, right-hand	per pair 24/–
ECOL2	Crossover points, left-hand	

EMC20	Switch rails (20-volt)	each	1/3
EMC6	Switch rails (6-volt)	„	1/3
TCP20	Terminal connecting plates (20-volt)	„	1/–
TCP6	Terminal connecting plates (6-volt)	„	1/–

Rails for Clockwork and Steam Trains, Gauge 0, 1¼"

CURVED RAILS

M9	Curved rails	(9-in. Radius) ...	per doz.	2/6
MB9	Curved brake rails	„ ...	each	3d.
A1	Curved rails	(1-ft. Radius) ...	per doz.	3/6
A1½	Curved half rails	„ ...	„	3/–
A1¼	Curved quarter rails	„ ...	„	2/6
AB1	Curved brake rails	„ ...	each	4d.
A2	Curved rails	(2-ft. Radius) ...	per doz.	3/6
A2½	Curved half rails	„ ...	„	3/–
A2¼	Curved quarter rails	„ ...	„	2/6
AB2	Curved brake rails	„ ...	each	5d.
DC2	Curved rails, double track	„ ...	½ doz.	6/–

STRAIGHT RAILS

BM	Straight rails (for MO Trains)	...	per doz.	2/6
B1	Straight rails	...	„	3/6
B½	Straight half rails	...	„	3/–
B¼	Straight quarter rails	...	„	2/6
BB1	Straight brake rails		each	4d.
BBR	Straight brake and reverse rails...		„	1/3
DS1	Straight rails, double track ...		½ doz.	5/3

CROSSINGS

CA1	Acute-angle crossings (for 1-ft. radius track)	each	1/9
CA2	Acute-angle crossings (for 2-ft. radius track)	„	1/6
CR1	Right-angle crossings (for 1-ft. radius track)	„	1/9
CR2	Right-angle crossings (for 2-ft. radius track)	„	1/6

POINTS

9-in. Radius (for MO Trains)

MR9	Right-hand points	...	per pair 3/–
ML9	Left-hand points		

For 1-ft. Radius Curves

PR1	Right-hand points	...	per pair 3/–
PL1	Left-hand points		

For 2-ft. Radius Curves

PR2	Right-hand points	...	per pair 3/–
PL2	Left-hand points		
PSR2	Points on solid base, right-hand		per pair 8/6
PSL2	Points on solid base, left-hand		
SPSR2	Points on solid base, right-hand		per pair 5/–
SPSL2	Points on solid base, left-hand		

These points are similar to Points PSR2 and PSL2 but they are not fitted with ground disc or for Hornby Control.

PARALLEL POINTS

PPR2	Parallel points, right-hand	per pair 3/6
PPL2	Parallel points, left-hand	

DOUBLE SYMMETRICAL POINTS

For 1-ft. Radius Curves

DSR1	Double sym. points, right-hand	per pair 3/6
DSL1	Double sym. points, left-hand	

For 2-ft. Radius Curves

DSR2	Double sym. points, right-hand	per pair 3/6
DSL2	Double sym. points, left-hand	

CROSSOVER POINTS

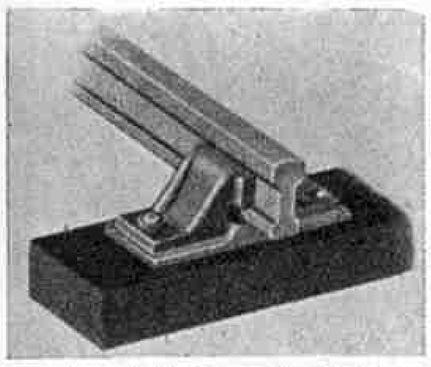
COR2	Crossover points, right-hand		per pair 12/–
COL2	Crossover points, left-hand		
RCP	Rail connecting plates ...	... ½ doz.	2d.

Many interesting illustrations and much useful information regarding Hornby Railway layouts are given in the booklets "How to plan your Hornby Railway," and "Hornby Layouts—100 Suggestions." Each of these booklets is obtainable from your dealer, price 3d., or from Meccano Ltd., Binns Road, Liverpool 13, price 4d. post free.

MECCANO LTD., LIVERPOOL 13

BOND'S NEW ADDRESS IS 357, EUSTON ROAD

These New Showrooms and Works are the largest in London devoted to the Model Maker. Come and see them. You will have an interesting time inspecting all the Finest Models, Tools and Materials which we stock.



Actual Photograph of Bond's British Permanent Way.

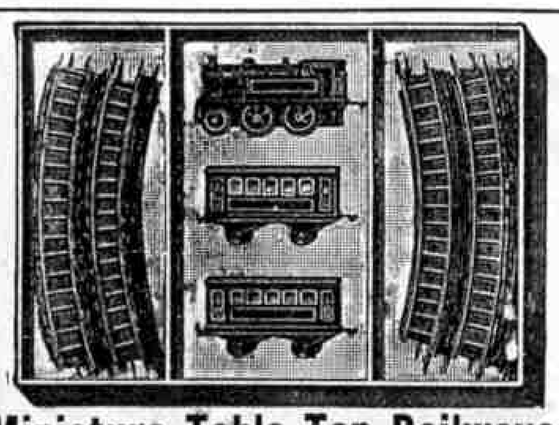
The Cheapest Super Detail Permanent Way

IN ALL GAUGES FROM "OO" TO 1" SCALE.

PRICES
STANDARD GAUGE "O" PARTS

Steel Rail, sheradised, per yd. **2d.**, **1/8** doz. yds.
Brass Rail, per yd. **4½d.**, **4/3** doz. yds.
Cast Chairs, slide-on fit, per 100 **1/2.**
Cast Chairs, for wooden keys, per 100 **1/2.**
Keys, per 100 **6d.**
Fishplates, per doz. **3d.**
Sleepers, stained correct colour, per 100 **2/3.**
Battens, ½" x ¼" section, per yd. **2½d.**, **2/3** doz. yds.
Pins, approx. 1,000, 6d. packet.
Track Gauge, special, with elec. chair jig, 9d. each.

All Prices Plus Postage. For Prices of Gauge "OO," "1," ½" Scale and ¾" Scale, see **General Catalogue.**



Miniature Table Top Railways

Clockwork Train Sets having loco, 2 coaches and circle of rail. Price **8/–**. Postage 7d.
Electric Set having loco, 3 coaches and oval of rail. Price **23/–**. Postage 8d.

SEPARATE PARTS	Clockwork	Electric
Tank Locomotive, Red, Green	4/9	8/6
Passenger Coach, L.N.E.R., L.M.S.	8d.	8d.
Signals	6d.	6d.
Telegraph Pole	3d.	3d.
Reverse Trip for Electric Locomotive...	—	4d.
Signal Cabin	10d.	10d.
Tunnel	11d.	11d.
Rails (straight), 7½ in. long ...	6d. dozen	5d. each
Rails (curved), 12 to circle ...	3/6 dozen	5d. each
Point Turnout to R.H. and L.H., 7½ in. long	1/9	4/6
Crossing (Scissor)	6d.	2/3
Rail with Regulating Resistance	—	4/6
Brake Rail for Clockwork Loco	4d.	—

Postage extra.

Balsa Model Aeroplanes

REAL FLYERS

We are offering the finest American Kits of parts ever put on the market for the Model Aeroplane Builder. All kits include all Balsa wood, Japanese tissue, wheels, pins, wire, elastic and full-size Drawing with instructions.

Kits for 12" wing span Flying Models of the AERONCA, BOEING P12E, CURTISS PURSUIT, HELL DIVER, LOCKHEED VEGA, MONOCOUPE, PUSS MOTH, STINSON RELIANT, TAYLOR CUB, VULTEE VIA, WACO.

PRICE **10d.** Postage 3d.

Kits for 24" wing span Flying Models of the STINSON RELIANT, WACO CUSTOM, MONOCOUPE, CONSOLIDATED P/30, FAIRCHILD, HAWKER FIGHTER, CURTISS HAWK, RICKMAN & MERRILL'S VULTEE.

PRICE **2/–**. Postage 6d.

Send for Bond's General Catalogue, Price 6d.; this also will interest you as its 200 pages list all the goods we stock.

Bond's o' Euston Road Ltd., 357, Euston Road, N.W.1

'Phone EUSton 5441-2 — Established 1887

15/11 Complete with rear lamp.

"WILCO" CYCLE DYNAMO LIGHTING SETS

are the best value obtainable and will give years of trouble-free service

This "Popular" model has both Battery and Dynamo lights controlled by rotary switch on top of lamp. 6-volt dynamo has double set of ball bearings that give silent running and long life. It has a pilot light at the top of the 4" front and is finished in black and chromium. "WILCO" Dynamo Sets from **13/9** to **23/6.**

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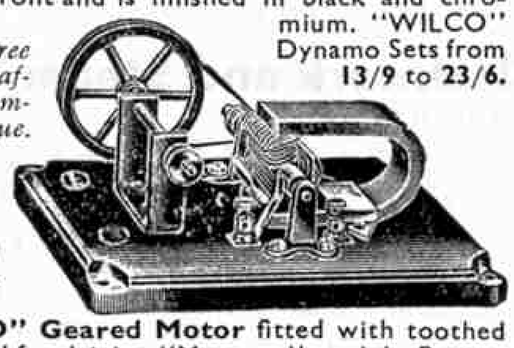

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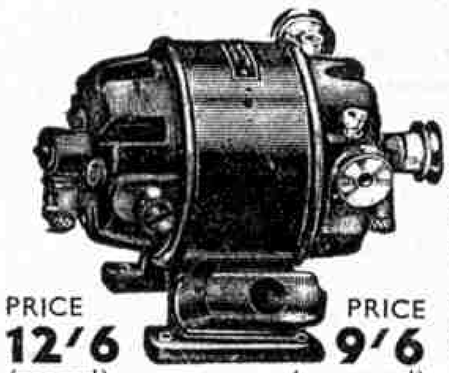

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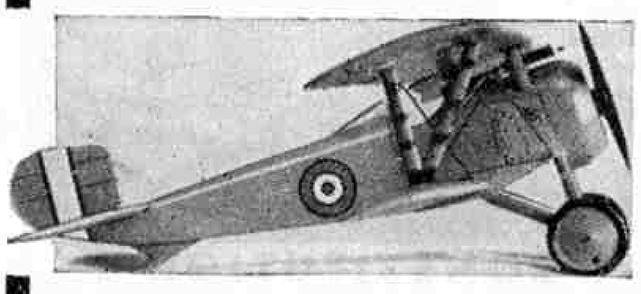

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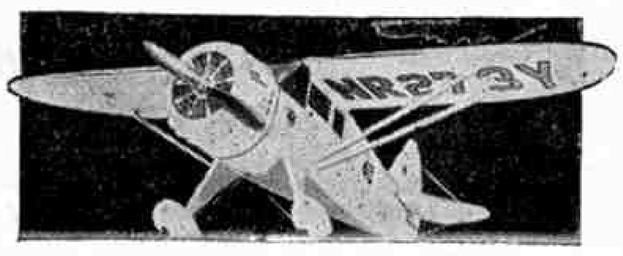

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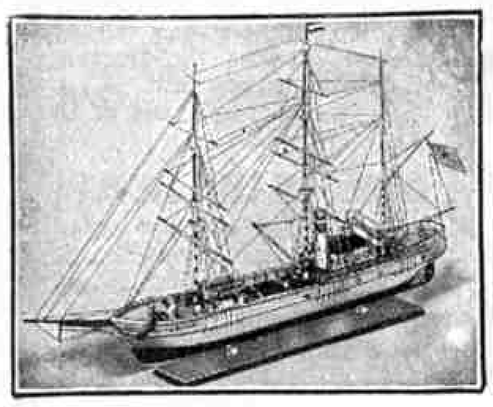

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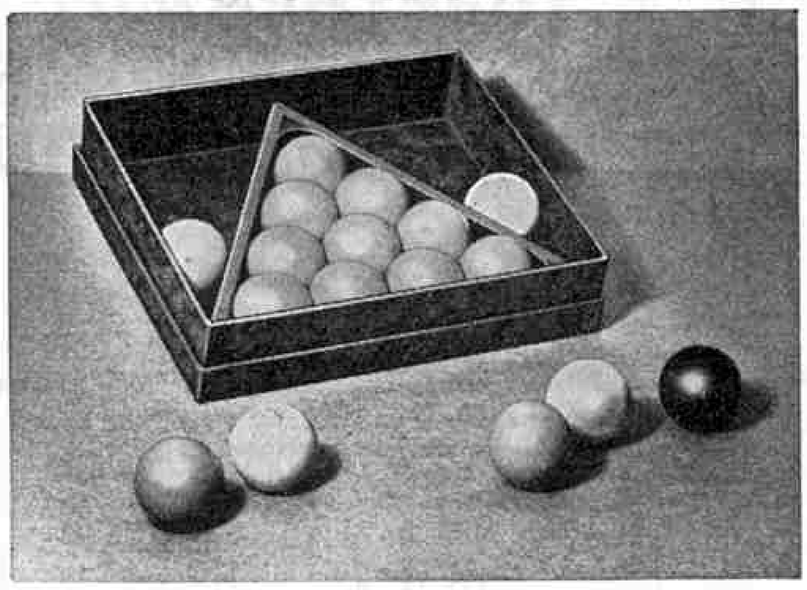

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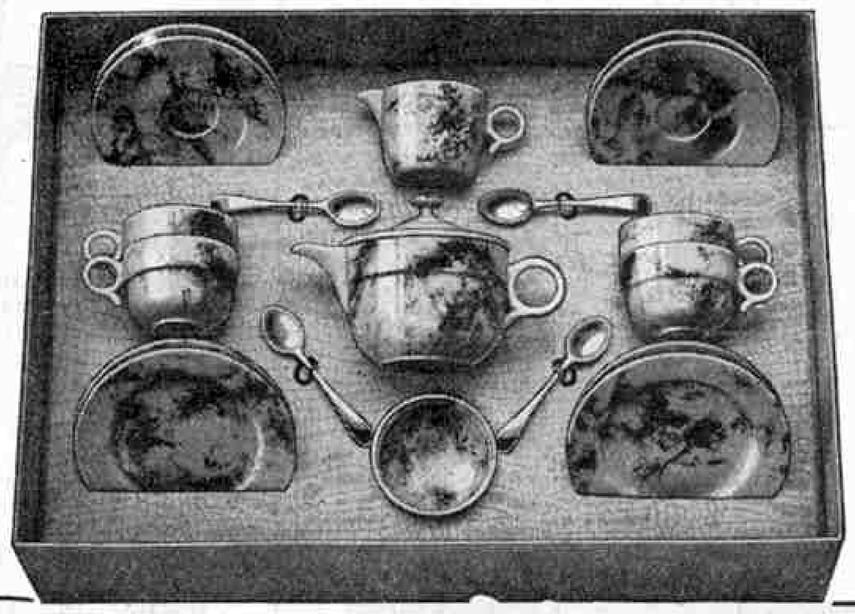

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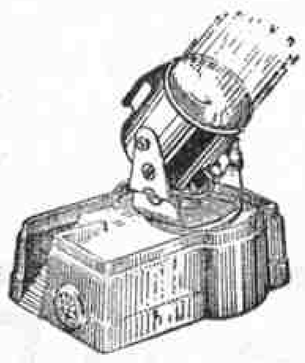

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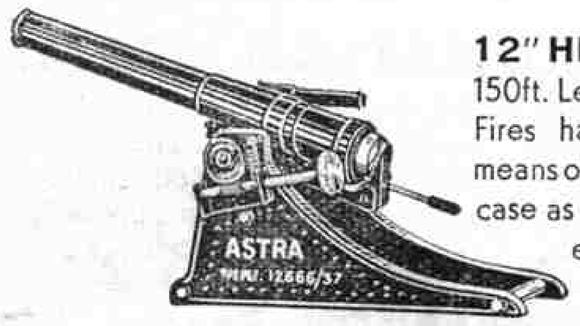

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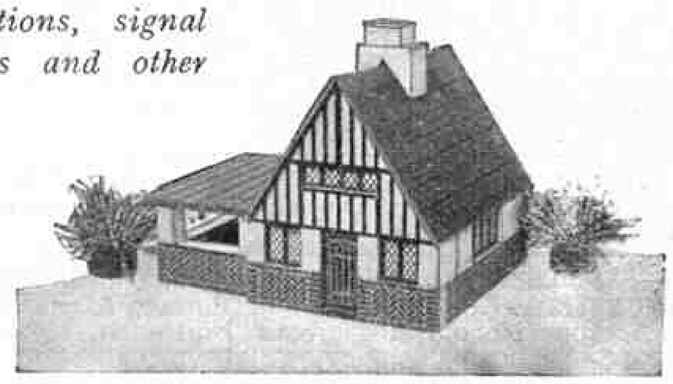

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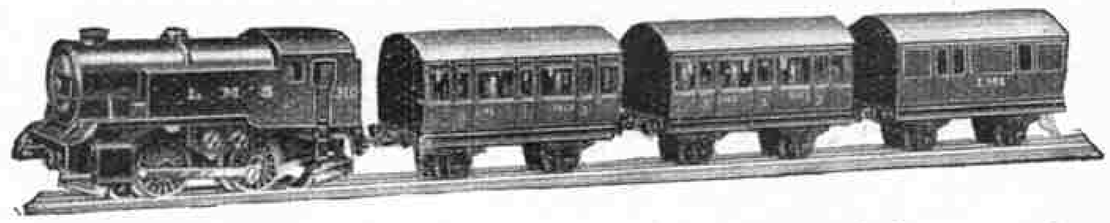

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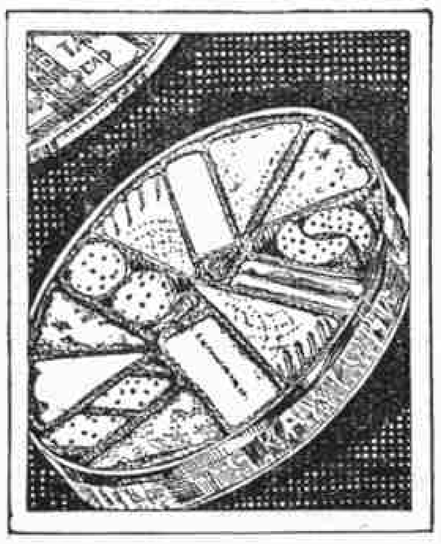

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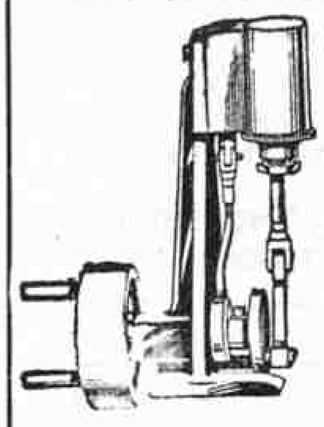

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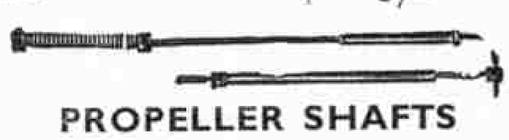

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Readers should note that all advertisements of Hornby Trains and other Meccano products included in this column relate to items no longer featured in the catalogue. Advertisements of current products cannot be accepted for this column.

Sale. Beck's Retort Stand complete, Retort, Liebig's Condenser, all almost new, two lengths Flexible Metal Piping, Bunsen. Cash only. Offers?—Lawson, 192, Inverkip Road, Greenock, N.B.

Breaking Collection. 280 Stamps, including Abyssinian worth 10/–. Take 25/– or nearest offer.—Anderson, 15, Standerton Road, Springs, Transvaal, South Africa.

Sale. 3 Cylinder Reversing Stationary Engine and Boiler with countershaft. Month old. Used four times. Cost 49/6. Accept 29/6.—Cowles, 3, Church Road, Goudhurst, Kent.

Sale. Set 5 Red-Green Meccano and extras, 30/–. Also 60 recent (1930 onwards) "Meccano Magazines," 7/6.—Quarmby, Eype, Hartley Way, Surrey.

Short Waver, 1-valve, very powerful, receives America, Japan, etc. with valve 19/6, without 17/6, carriage paid. Stamp particulars—63, Avenue Approach, Bury St. Edmunds.

No. 4 Red-Green Meccano, Motor and Accessories. Cost £3/10/–. Sell 35/–.—113, Orchard Way, Croydon.

Collection in two Albums. Make nice gift, 10/–.—Jones, 11, Ridge Crest, Enfield, Middlesex.

Pathé Imp Projector 9.5 Motor Drive Super Attachment (almost new) in case. Cost £7/12/6. Bargain £4/15/–.—Maxwell, 95, High Street, Scunthorpe.

For Sale. Approximately 800 Colonial, 2,900 Foreign Stamps. Collector disposing. What offers?—Harry Crooks, 63, Pim's Avenue, Belfast.

Sale. Engine, Rails, Wagons, etc. Gauge O. 15/– or offers. Details—Box 1101.

Sale. Bowman Steam Loco, Model 300, almost unused. 12/6.—Warden, 7, King Edward Road, Rochester.

Sale. Chemicals and Laboratory Apparatus. Bargain prices. Stamp list.—Smith, Purlington, Chard.

50 "Boys' Friend" Library, 17 "Schoolboys' Own" Library, 10 Sexton Blake, 12/6 lot.—T. Caspers, 43, Beech Avenue, Radlett, Herts.

No. 5 Red-Green Meccano in Cabinet with Meccano Clockwork Engine, also Primus Engineering (metal and wood), £2/10/– or nearest offer. Apply—Wood, Brentwood, Grendon Avenue, Oldham, Lancs.

Exchange Chemistry Outfit, Books, Cameras, Collection Butterflies, Cigarette Cards, for Fishing Tackle or Stamps.—"Philatelist," 3, Dawson Road, Birmingham 21.

Wanted. "Gems," January 1931 to July 1933. State price.—Hetherington, Hulme Hall, Victoria Park, Manchester.

"Railway Wonders of the World," first volume, unbound, perfect condition. 10/– post free.—George, 198, Eastern Avenue, Ilford.

Sale. 120 "Magnets," August 1935 to October 1937. None missing. What offers?—B. Rumbles, 80, Netherlands Road, New Barnet, Herts.

Sale. 92/– worth Red-Green Meccano, including large Clockwork Motor. Good condition. 47/6.—Jordan, 16, Old Farleigh Road, Selsdon, Surrey.

No. 7 Meccano, Red-Green, Enamelled Cabinet, condition perfect, recently checked. On view at Menston, Leeds. Accept £12, or near offer.—Hoult, Balliol, Oxford.

For Sale. 25/– Bassett-Lowke Clockwork Engine, excellent condition. Take 15/–. Write—D. W. Cannadine, 50, Gade Avenue, Watford, Herts.

For Sale. Blank Automatic, new, 10/6. £7 Books, Tennis Racquet, etc.—Taylor. 6, Faithlie Street, Fraserburgh.

For Sale. Hornby Railway, purchased 1929/30 but in good condition, complete with Track, Signals, Rolling Stock and two Locos, including fittings for Hornby Control System; £3, or would separate. Also number of "Meccano Magazines." Stamp for list.—Staple, Tonbridge, Kent.

For Sale. £5 Bassett-Lowke Electric Engine, 2 Clockwork Engines, Rolling Stock, 50 ft. Electric Rails, 4 Points, 2 Stations, etc. Excellent condition. Send stamp for details.—P. Copp, 39E, Emperors Gate, London, S.W.7.

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For Sale. 3-Valve G.E.C. Wireless complete. Valves, Batteries, Loudspeaker, etc, 30/– or offer.—Coulson, 273, Ings Road, Hull.

Sale. No. 7 Red-Green Enamelled Meccano, Wood Cabinet, complete with Electric Motor and Transformer. In excellent condition. £12 or nearest offer.—**Carrivick, 28, Bull Royd Crescent, Allerton Road, Bradford.**

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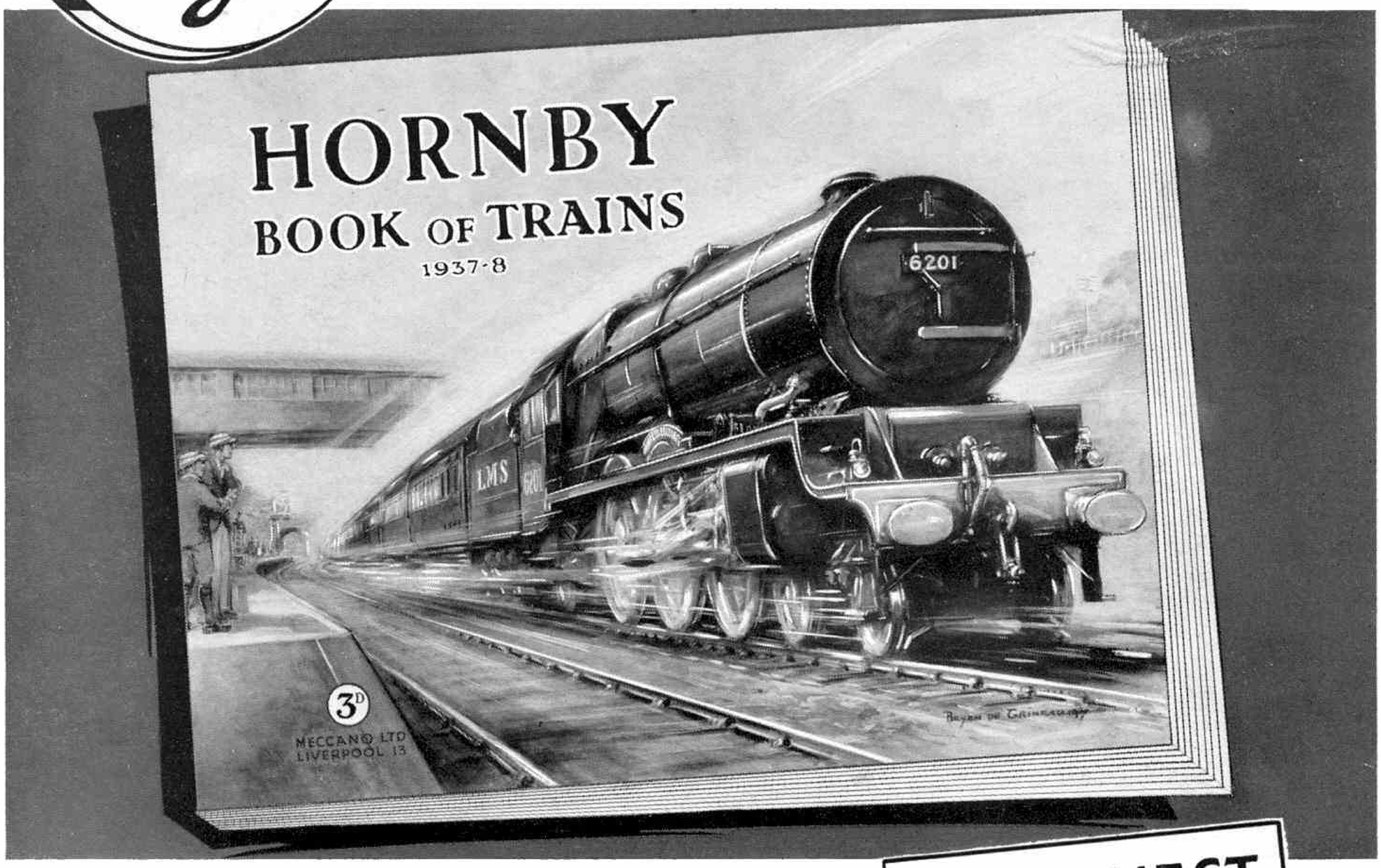

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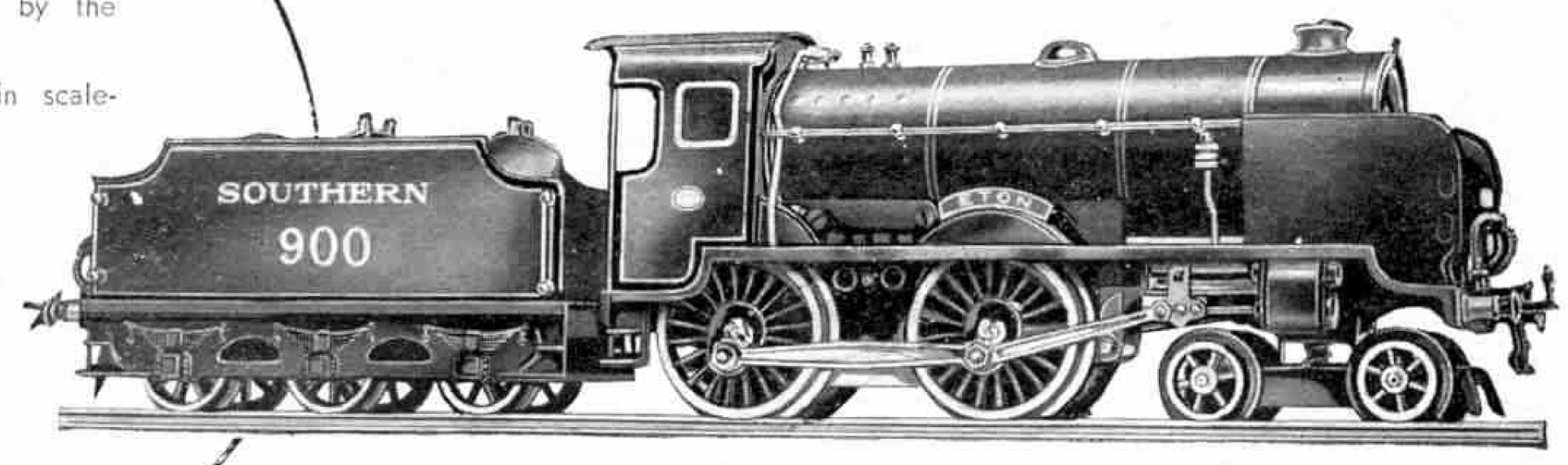

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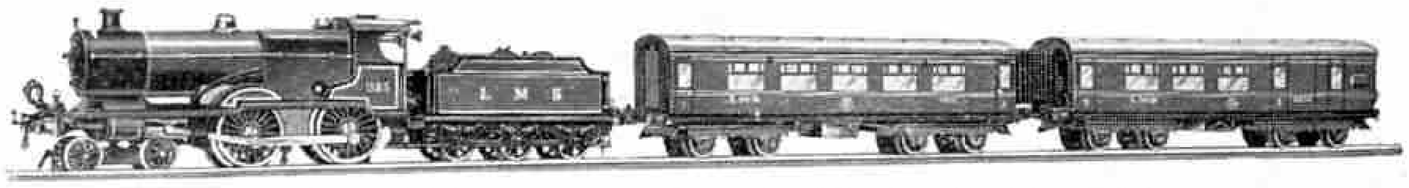

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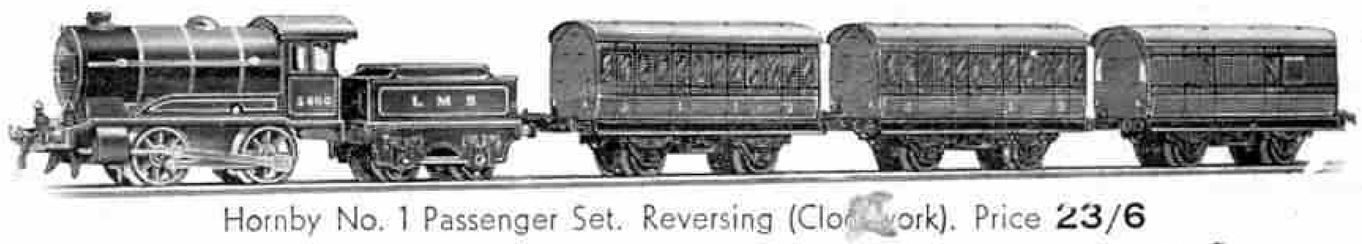

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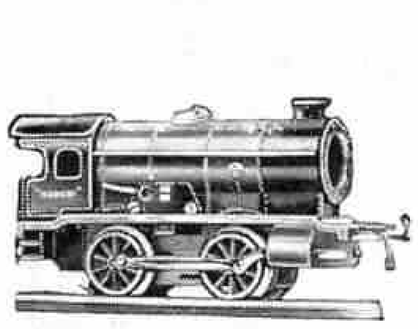
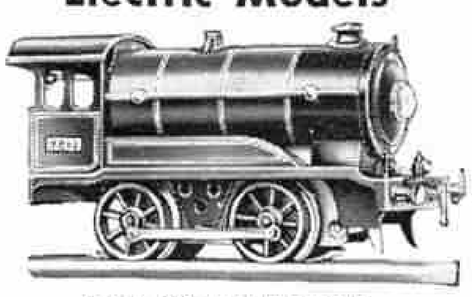
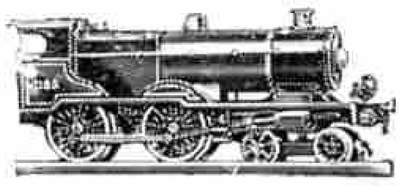


EM120 (20-volt) or EM16 (6-volt) ELECTRIC LOCOMOTIVE

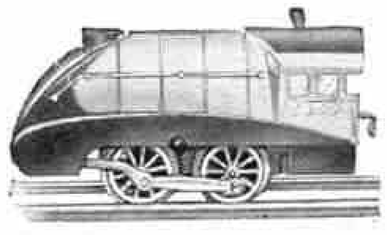


EO20 (20-volt) ELECTRIC LOCOMOTIVE



E220 (20-volt) SPECIAL ELECTRIC LOCOMOTIVE

Clockwork Models



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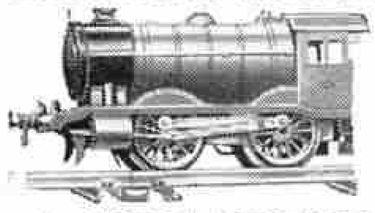
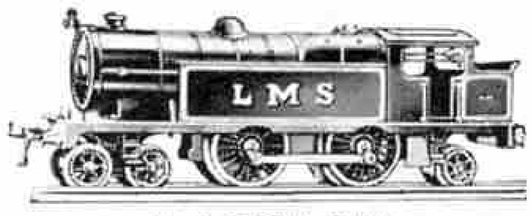


No. 1 SPECIAL LOCOMOTIVE



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